DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

OFFICE OF DESIGN POLICY & SUPPORT
INTERDEPARTMENTAL CORRESPONDENCE

FILE P.I. # 0014131 **OFFICE** Design Policy & Support

Cherokee County
GDOT District 6 - Cartersville **DATE** 11/14/2017
SR 20 Widening from CR 281/Scott
Road to CR 762/Union Hill Road

FROM for Brent Story, State Design Policy Engineer

TO SEE DISTRIBUTION

SUBJECT **APPROVED CONCEPT REPORT**

Attached is the approved Concept Report for the above subject project.

Attachment

DISTRIBUTION:

Hiral Patel, Director of Engineering
Joe Carpenter, Director of P3
Albert Shelby, Director of Program Delivery
Darryl VanMeter, Assistant Director of P3/State Innovative Delivery Administrator
Kim Nesbitt, Program Delivery Administrator
Bobby Hilliard, Program Control Administrator
Cindy VanDyke, State Transportation Planning Administrator
Eric Duff, State Environmental Administrator
Andrew Heath, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Monica Flournoy, State Materials and Testing Administrator
Patrick Allen, State Utilities Engineer
Benny Walden, Statewide Location Bureau Chief
DeWayne Comer, District Engineer
David Acree, District Preconstruction Engineer
Jun Birnkammer, District Utilities Engineer
Cleopatra James, Project Manager
BOARD MEMBER - 11th Congressional District

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
PROJECT CONCEPT REPORT

Project Type: Reconstruction/ Rehabilitation
P.I. Number: 0014131
GDOT District: 6
County: Cherokee
Federal Route Number: N/A
State Route Number: 20
Project Number: N/A

Widening of SR 20 from CR 281/Scott Rd to CR 762/Union Hill Rd

Submitted for approval:

Scott Gero, AECOM — 6/30/17
Consultant Designer & Firm — Date

Albert Shelby KWN — 7/14/17
State Program Delivery Administrator — Date

Cleopatra James KESD — 7/7/17
GDOT Project Manager — Date

Recommendation for approval:

ERIC DUFF*/EKP — 7/18/2017
State Environmental Administrator — Date

CHRISTINA BARRY*/EKP — 7/28/2017
FOR State Traffic Engineer — Date

ERIK ROHDE*/EKP — 7/29/2017
FOR Project Review Engineer — Date

KEVIN COWAN*/EKP — 7/27/2017
FOR State Utilities Engineer — Date

DAVID ACREE*/EKP — 7/28/2017
FOR District Engineer — Date

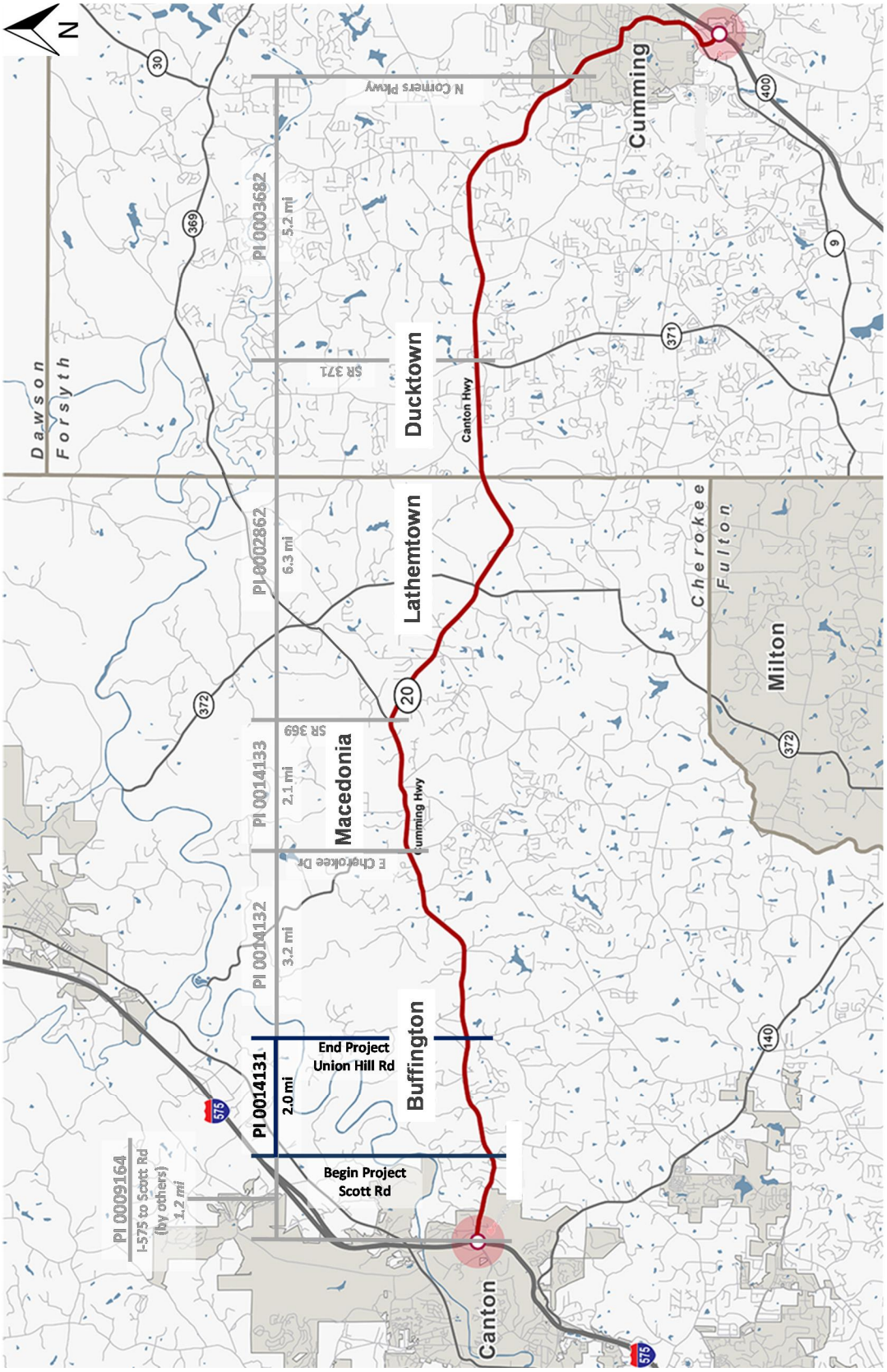
☒ MPO Area: This project is consistent with the MPO adopted Regional Transportation Plan (RTP)/Long Range Transportation Plan (LRTP).

☐ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

CINDY VANDYKE*/EKP — 7/19/2017
State Transportation Planning Administrator — Date

*- RECOMMENDATION ON FILE

PROJECT LOCATION MAP



PLANNING AND BACKGROUND

Project Justification Statement: The following Project Justification Statement was provided for PI 0003681, PI 0002862, and PI 0003682 by the Office of Planning on June 18, 2012. PI 0003681 was later divided into three separate projects: PI 0014131, PI 0014132, and PI 0014133.

SR 20 is a two lane corridor from I-575 to just west of SR 400 where it changes to four lanes south of Crestbrook Drive/Forsyth County through the SR 400 interchange. Based on 2011 Average Annual Daily Traffic (AADT) the current level of service (LOS) of SR 20 from I-575 to SR 369 is "F" with an AADT of 25,650. The SR 369/Cherokee County to SR 371/Forsyth County segment has an AADT of 13,550 and LOS "D". SR 20 from SR 371 to Crestbrook Drive has an AADT of 22,400 and LOS "E". SR 20 increases to a four lane corridor from south of Crestbrook Drive to SR 400 and has a LOS "C" and AADT of 34,200.

On the western end of the project, the no build scenario design traffic (2040) for SR 20 is 53,550 with LOS "F". Between SR 369 and SR 371, the 2040 traffic is 35,050 with LOS "F". SR 20 between SR 371 and SR 400 has a LOS of "F", with design traffic of 42,000 where SR 20 is two lanes. Where SR 20 is four lanes west of SR 400 it is LOS "D" (52,950).

SR 20 is classified as an urban principal arterial from I-575 to Union Hill Rd/Cherokee County, a rural principal arterial from Union Hill Rd. to County Line Rd, and then an urban principal arterial again from County Line Rd to SR 400/Forsyth County. The crash rates for the section of SR 20 in Cherokee County (east of I-575) were above the statewide average for the urban principal arterial and below for the rural principal arterial road in the years 2007-2009. The rates for the portion of SR 20 classified as an urban principal arterial in the years 2007-2009 were 245, 200, and 320 crashes per 100 million vehicle miles traveled (MVMT), whereas the statewide averages were 176, 170, and 165 crashes per 100 MVMT. The rates for the portion of SR 20 classified as a rural principal arterial in the years 2007- 2009 were 228, 186, and 173 crashes per 100 MVMT respectively, whereas the statewide averages were 249, 249, and 235 crashes per 100 MVMT. The crash rates for the portion of SR 20 in Forsyth County were all above the statewide averages. In the years 2007-2009 the crash rates were 480, 459, and 290 crashes per 100 MVMT for an urban principal arterial.

The future (2040) traffic for this section of the SR 20 corridor is anticipated to have deficient LOS, from I-575 to SR 400. West of I-575 traffic volumes on SR 20 decline from 23,500 ADT (LOS B) to 15,950 ADT (LOS D). Therefore, it is the opinion of the Office of Planning that I-575 could serve as the western logical termini. The four-lane section starting at Crestbrook Drive would serve as the eastern termini.

The Statewide Transportation Plan defines acceptable LOS as "A" to "C", with sometimes "D" being used in large urban areas based on the circumstances. The goals of these projects are to alleviate present and future congestion along SR 20 between I-575 and SR 400 and to reduce the crash frequency along the corridor.

Existing conditions: The existing highway consists of a rural two-lane, undivided section from the project beginning at Scott Rd to the project end at Union Hill Rd, with some left and right turn lanes at larger intersections. Union Hill Rd is the only major intersection along the project. Scott Rd and Union Hill Rd are the only signalized intersections. There are no sidewalks, major structures, or major utilities.

Other projects in the area:

PI 0014132 – SR 20 FROM CR 762/UNION HILL RD TO CR 765/EAST CHEROKEE DR
PI 0014133 – SR 20 FROM CR 765/EAST CHEROKEE DRIVE TO SR 369
PI 0002862 – SR 20 FROM SR 369/CHEROKEE TO SR 371/FORSYTH
PI 0003682 – SR 20 FROM SR 371 TO N CORNERS PKWY (West side of Cumming)
PI 0009164 – SR 20 FM 0.34 MI E OF I-575 TO 0.15 E OF CR 281/SCOTT RD

MPO: Atlanta TMA **TIP #:** CH-020B

Congressional District(s): 11

Federal Oversight: ☐ PoDI ☐ Exempt ☒ State Funded ☐ Other

Projected Traffic: ADT 24 HR T: 16 %
Current Year (2011): 21,550 Open Year (2025): 31,900 Design Year (2045): 56,900
Traffic Projections Performed by: GCA, Inc.
Date approved by the GDOT Office of Planning: 5/20/14

Functional Classification (Mainline): Urban Principal Arterial

Complete Streets - Bicycle, Pedestrian, and/or Transit Standard Warrants:
Warrants met: ☐ None ☐ Bicycle ☒ Pedestrian ☐ Transit

Sidewalks will be provided throughout the project.

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? ☒ No ☐ Yes

Pavement Evaluation and Recommendations

Initial Pavement Evaluation Summary Report Required?		☐ No	☒ Yes
Initial Pavement Type Selection Report Required?		☐ No	☒ Yes
Feasible Pavement Alternatives:	☐ HMA	☐ PCC	☒ HMA & PCC

DESIGN AND STRUCTURAL

Description of the proposed project: PI 0014131 is the widening and reconstruction of SR 20 in Cherokee County near Canton from east of Scott Rd to east of Union Hill Rd to six-lanes (three lanes in each direction) with a 20 foot raised median and urban shoulders. Access to side roads and driveways will be controlled by Restricted Crossing U-Turns (RCUTs) placed in the median; RCUT locations are shown in the layouts but may change based on preliminary design. Truck turnarounds are provided at certain RCUT locations based on consideration of adjacent facilities that may draw tractor trailers (factories, farms with chicken houses, landscaping or stone supply companies, etc). The project resides within an MS4 area and on/near a ridgeline, which places almost all drainage areas near receiving stream headwaters having less than 5 mi^2 of drainage areas. To satisfy the requirements of the downstream hydrologic assessment (See section 10.2.1.1 of the 2016 Drainage Manual) the project proposes to capture all pavement runoff through use of curb and gutter (urban shoulder) into a closed drainage system, which would pipe roadway runoff to permanent post-construction stormwater dry detention basins to treat for water quality as well as to detain and provide protection from downstream flooding. The total project length is about 2 miles. There are no bridges or other major structures.

This project begins where PI 0009164 ends with the Scott Rd intersection being constructed with PI 0009164; PI 0009164 is scheduled to be let to construction before this project.

Mainline Design Features:

Typical Section: 6-lane urban, 11 & 12 ft wide travel lanes, 20' raised median, curb & gutter

Feature	Existing	Policy	Proposed
Typical Section:			
- Number of Lanes	2		6
- **Lane Width(s)**	**12 ft**	**11 ft-12 ft**	**11 ft (inside & middle)** **12 ft (outside)**
- **Median Width & Type**	**N/A**	**Varies**	**20 ft Raised**
- **Border Area Width**	**N/A**	**10 ft - 16 ft**	**16 ft**
- **Outside Shoulder Slope**	**Varies**	**2%**	**2%**
- **Inside Shoulder Width**	**N/A**	**C&G**	**C&G**
- **Sidewalks**	**N/A**	**5 ft**	**5 ft**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**N/A**	**N/A**
Posted Speed	45 mph		45 mph
Design Speed	**Unknown**	**45 mph**	**45 mph**
Minimum Horizontal Curve Radius	**Unknown**	**711**	**711**
Maximum Superelevation Rate	**Unknown**	**4%**	**4%**
Maximum Grade	**Unknown**	**7%**	**7%**
Access Control	Unknown		Permitted
Design Vehicle	Unknown		WB-67
Pavement Type	Asphalt		TBD

*According to current GDOT design policy if applicable

Major Interchanges/Intersections: Union Hill Rd/Harmony Dr

Lighting required: ☒ No ☐ Yes

Off-site Detours Anticipated: ☒ No, for mainline ☒ Undetermined, sideroads ☐ Yes

Transportation Management Plan [TMP] Required: ☒ No ☐ Yes
If Yes: Project classified as: ☐ Non-Significant ☐ Significant
TMP Components Anticipated: ☐ TTC ☐ TO ☐ PI

Note: TMP is not required because project is state funded.

Is the project located on a NHS roadway? ☐ No ☒ Yes

Design Exceptions/Design Variances to FHWA or GDOT Controlling Criteria anticipated:

FHWA or GDOT Controlling Criteria	No	Undeter-mined	Yes	DE or DV	Approval Date (if applicable)
1. Design Speed	☒	☐	☐		
2. Design Loading Structural Capacity	☒	☐	☐		
3. Stopping Sight Distance	☒	☐	☐		
4. Horizontal Curve Radius	☒	☐	☐		
5. Maximum Grade	☒	☐	☐		
6. Vertical Clearance	☒	☐	☐		
7. Superelevation Rate	☒	☐	☐		
8. Lane Width	☒	☐	☐		
9. Cross Slope	☒	☐	☐		
10. Shoulder Width	☒	☐	☐		

Design Variances to GDOT Standard Criteria anticipated:

GDOT Standard Criteria	Reviewing Office	No	Undeter--mined	Yes	Approval Date (if applicable)
1. Access Control	DP&S	☒	☐	☐	
2. Shoulder Width	DP&S	☒	☐	☐	
3. Intersection Sight Distance	DP&S	☒	☐	☐	
4. Intersection Skew Angle	DP&S	☒	☐	☐	
5. Tangent Lengths on Reverse Curves	DP&S	☒	☐	☐	
6. Lateral Offset to Obstruction	DP&S	☒	☐	☐	
7. Rumble Strips	DP&S	☒	☐	☐	
8. Safety Edge	DP&S	☒	☐	☐	
9. Median Usage	DP&S	☒	☐	☐	
10. Roundabout Illumination Levels	DP&S	☒	☐	☐	
11. Complete Streets Warrants	DP&S	☒	☐	☐	
12. ADA Requirements in PROWAG	DP&S	☒	☐	☐	
13. GDOT Construction Standards	DP&S	☒	☐	☐	
14. GDOT Drainage Manual	DP&S	☒	☐	☐	
15. GDOT Bridge & Structural Manual	Bridges	☒	☐	☐	

VE Study anticipated: ☐ No ☐ Yes ☒ Completed – Date: 3/2/2017

See attachments for VE Implementation Letter.

UTILITY AND PROPERTY

Railroad Involvement: No railroads are in the vicinity of the project.

Utility Involvements:
AGL – Natural Gas
Cherokee County – Water & Sewer
Comcast
Georgia Power – Distribution Power
Sunesys – Telecom

SUE Required: ☐ No ☒ Yes ☐ Undetermined

Public Interest Determination Policy and Procedure recommended? ☒No ☐Yes

Right-of-Way (ROW): Existing width: 80-150ft. Proposed width: 150+ft.
Required Right-of-Way anticipated: ☐None ☒Yes ☐Undetermined
Easements anticipated: ☐None ☒Temporary ☒Permanent ☒Utility ☐Other

Anticipated total number of impacted parcels: 101
Displacements anticipated: Businesses: 10
Residences: 18
Other: 0
Total Displacements: 28

Location and Design approval: ☐ Not Required ☒ Required

Impacts to USACE property anticipated? ☒ No ☐ Yes ☐ Undetermined

Is Federal Aviation Administration (FAA) coordination anticipated? ☐No ☒ Yes

Note: Project is within 5 miles of the Cherokee County Airport.

ROUNDABOUTS

Per email from the Office of Traffic Operations received 8/30/16, roundabouts do not need to be considered on six-lane roadways (see Attachment 6).

CONTEXT SENSITIVE SOLUTIONS

Issues of Concern:
Potential impacts that may require context-sensitive solutions along this project corridor include the following:

- Historic properties
- Streams and wetlands
- Residences and businesses

Impacts to these resources will be minimized by techniques such as utilizing steeper slopes with guardrail, walls, and coordinating with the agencies for optimal design solutions. We have also reduced the lane width of four of the lanes to 11 feet from 12 feet.

In addition, meetings have been held with the City of Canton and Cherokee County to determine the appropriate design for this corridor. Five rounds of PIOHs have been held to understand the needs of the general public and to develop and present the current concept layout. We will incorporate design elements to meet these needs as appropriate.

Context Sensitive Solutions Proposed:
Alignment shifts (e.g., widening to the north, south, and symmetrical) will be utilized to minimize impacts to historic properties, streams/wetlands, residences, and businesses. In addition, narrower shoulders, steeper slopes, and the use of retaining walls will be considered to further reduce the footprint and impacts of the proposed improvements. Due to the safety concerns along the corridor, restricted crossing u-turn medians are proposed at frequent intervals along the corridor, which allow for passenger car and tractor trailer turn arounds and reduce the number of conflict points for the vehicles as compared to a full access median. Access to all parcels will be maintained throughout construction.

ENVIRONMENTAL & PERMITS

Anticipated Environmental Document:

NEPA: ☐ PCE ☐ CE ☐ EA-FONSI ☐ EIS

GEPA*: ☐ Type A ☐ Type B ☐ EER ☒ None

*A GEPA document must be prepared only for state funded projects where the project cost meets or exceeds $100 million.

Level of Environmental Analysis:

☐ The environmental considerations noted below are based on preliminary desktop or screening level environmental analysis and are subject to revision after the completion of resource identification, delineation, and agency concurrence.

☒ The environmental considerations noted below are based on the completion of resource identification, delineation, and agency concurrence.

Water Quality Requirements:

MS4 Permit Compliance – Is the project located in a MS4 area? ☐ No ☒ Yes

Post-construction stormwater management with permanent practices and structures put in place to reduce, treat, or minimize stormwater pollution from stabilized, developed areas, are being considered and will be incorporated in the plans as needed. There is no project level exclusion that applies to this project.

Is Protected Species water quality mitigation anticipated? ☒ Yes ☐ No

Environmental Permits/Variances/Commitments/Coordination anticipated:

Permit/ Variance/ Commitment/ Coordination Anticipated	No	Yes	Remarks
1. U.S. Coast Guard Permit	X		
2. Forest Service/NPS	X		
3. CWA Section 404 Permit		X	404 Permit will be evaluated on a corridor basis.
4. Tennessee Valley Authority Permit	X		
5. 33 USC 408 Decision	X		
6. Buffer Variance		X	Buffer variance will be evaluated on a corridor basis.
7. Coastal Zone Management Coordination	X		
8. NPDES		X	
9. FEMA		X	FEMA coordination will be evaluated on a corridor basis.
10. Cemetery Permit	X		
11. Other Permits	X		
12. Other Commitments		X	Special Provisions for protection of bats and darters anticipated
13. Other Coordination	X		

Is a PAR required? ☐ No ☒ Yes ☐ Completed – Date:

The Screen 2 Memo is being converted into a PAR document by using supplemental information. This process is ongoing as of the writing of this report and is being coordinated with the IRT.

Environmental Comments and Information:

NEPA/GEPA: The project is being advanced under GEPA as a state funded project with the lead agency as the U.S. Army Corps of Engineers (USACE).

Ecology: The 2016 ecological field survey identified 24 features including 11 upland drainage features and 13 jurisdictional features, including 8 intermittent streams, 2 perennial streams, and 3 wetlands. Features are inclusive to each PI number. A 404 Permit and a Stream Buffer Variance will be required.

History: The 2015 SHPO concurred with Historic Resource Survey Report identified 10 National Register- eligible properties. SHPO concurrence was received in 2015. Home plots containing family cemeteries are scattered throughout the corridor, but would not be impacted by the project.

Archeology: The archaeology field work is underway and no National Register eligible sites have been identified to date within these limits.

Air Quality:

Is the project located in an Ozone Non-attainment area?	☐ No	☒ Yes
Is a Carbon Monoxide hotspot analysis required?	☐ No	☒ Yes

A Carbon Monoxide hotspot analysis is required for the project corridor as the corridor contains at least one traffic signal, design year traffic volumes exceed 10,000 vpd, and the level of service is D, E or F.

Noise Effects: No noise study is required for the corridor as it is a state funded project. Noise studies will be completed for National Register Eligible historic properties.

Public Involvement: Five Public Involvement Open Houses (PIOH) were held: PIOH #1 (Scoping Mtg) on May 16, 2013 and May 21, 2013; PIOH #2 on December 10, 2013 and December 12, 2013; PIOH #3 on September 15, 2015 and September 17, 2015; and PIOH #4 on December 6, 2016 and December 15, 2016; PIOH #5 on May 8 and 16, 2017. Each public meeting was held in Canton and Cumming for the convenience of attendees. In addition, a Citizen's Advisory Committee and a Technical Advisory Committee were formed early in the project development to inform the alternatives evaluation.

Major stakeholders: Major stakeholders include the traveling public (local users and cross-county users), homeowners, business associations located on SR 20 and in the vicinity of the roadway project, and agencies/stakeholders with interest in the resources located along the corridor.

CONSTRUCTION

Issues potentially affecting constructability/construction schedule:
Due to the presence of protected bats along the corridor, there may be clearing restrictions; however, this is an ongoing co-ordination issue with resource agencies that will be determined through the GEPA process.

Due to the width of the proposed improvements, we anticipate maintaining traffic on the current corridor while constructing the improvements. It will require multiple stages to widen and shift traffic through completion of all improvements.

Early Completion Incentives recommended for consideration: ☒ No ☐ Yes

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Initial Concept Meeting: The initial concept meeting was held on March 5, 2013 (District 1) and March 6, 2013 (District 6); meeting minutes are attached.

Concept Meeting: The concept meeting was held on March 10, 2017; meeting minutes are attached.

Other coordination to date: See Public Involvement section.

Project Activity	Party Responsible for Performing Task(s)
Concept Development	AECOM
Design	AECOM
Right-of-Way Acquisition	GDOT
Utility Coordination (Preconstruction)	GDOT, AECOM
Utility Relocation (Construction)	Utility Owner, Contractor
Letting to Contract	GDOT
Construction Supervision	GDOT
Providing Material Pits	Contractor
Providing Detours	Contractor
Environmental Studies, Documents, & Permits	AECOM
Environmental Mitigation	GDOT
Construction Inspection & Materials Testing	GDOT

Project Cost Estimate Summary and Funding Responsibilities:

	PE Activities					
	PE Funding	Section 404 Mitigation	ROW	Reimbursable Utilities	CST*	Total Cost
Funded By	GDOT	GDOT	GDOT	GDOT	GDOT	
$ Amount	$2,015,345**	$99,072***	$13,967,000	$1,975,000	$22,320,761	$40,377,178
Date of Estimate	12/15/15	8/31/17	6/13/17	2/22/17	8/24/17	

*CST Cost includes: Construction, Engineering and Inspection, Contingencies and Liquid AC Cost Adjustment.

**Total PE funding for PI 0003681 (which includes PIs 0009164, 0014131, 0014132, 0014133, 0002862, and 0003682) is $20,153,451. The funding for this project was estimated based on the percentage this project makes up of the entire corridor.

***Total estimated mitigation cost (excluding buffer impacts) for the entire corridor (including PIs 0014131, 0014132, 0014133, 0002862, and 0003682) is $931,280. The cost for this project was estimated based on the percentage this project makes up of the entire corridor.

ALTERNATIVES DISCUSSION

Alternative selection:

Preferred Alternative: The proposed alignment will generally follow the existing roadway from Scott Rd to Union Hill Rd. Corrections to the horizontal and vertical alignment along that section were made to meet the design criteria and to minimize impacts to residents, businesses, historic properties, streams, and wetlands.			
Estimated Property Impacts:	101 parcels, 28 displacements	**Estimated Total Cost:**	$40,377,178
Estimated ROW Cost:	$13,967,000	**Estimated CST Time:**	24 months
Rationale: This alternative was chosen because it meets the goals outlined in the project justification statement. It is the best-fit in terms of avoidance of displacements, streams, wetlands, and historic properties.			

No-Build Alternative: No improvements to SR 20.			
Estimated Property Impacts:	0 parcels, 0 displacements	**Estimated Total Cost:**	$0
Estimated ROW Cost:	$0	**Estimated CST Time:**	0 months
Rationale: This alternative fails to address the need and purpose of the project.			

Alternative 1: This alternative (shown as Conceptual Alternatives 3A and 3B in Attachment 10) would construct a new, limited access facility to the north or south of existing SR 20.

Impacts: See Attachment 10 for detailed cost and impact analysis.

Rationale: This alternative was evaluated in the Screen 2 analysis. This alternative is not recommended to advance for further evaluation, as it is almost twice as expensive as the preferred alternative.

Alternative 2: This alternative (shown as Conceptual Alternative 4 in Attachment 10) would go off the existing SR 20 and implement a localized bypass, tying back in to existing at the beginning and end of the project.

Impacts: See Attachment 10 for detailed cost and impact analysis.

Rationale: This alternative was evaluated in the Screen 2 analysis. This alternative would have a similar construction cost to the preferred alternative and similar impacts to residents, businesses, historic properties, streams and wetlands. At the PIOHs, we heard that the public would prefer to widen existing rather than impact the surrounding communities with bypasses. Therefore, with state funding for the project, widening existing was selected as the preferred alternative.

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
2. Typical sections
3. Detailed Cost Estimates:
    a. Construction including Engineering and Inspection and Contingencies
    b. Completed Liquid AC Cost Adjustment forms
    c. Right-of-Way
    d. Utilities
    e. Environmental Mitigation
4. Traffic study
5. Traffic diagrams
6. Roundabout Data
7. Minutes of Concept meetings
8. Minutes of any meetings that shows support or objection to the concept
9. Screen 2 Conceptual Alternatives
    a. Map
    b. Displacements
    c. Costs
    d. Comprehensive Matrix
10. VE Implementation Letter

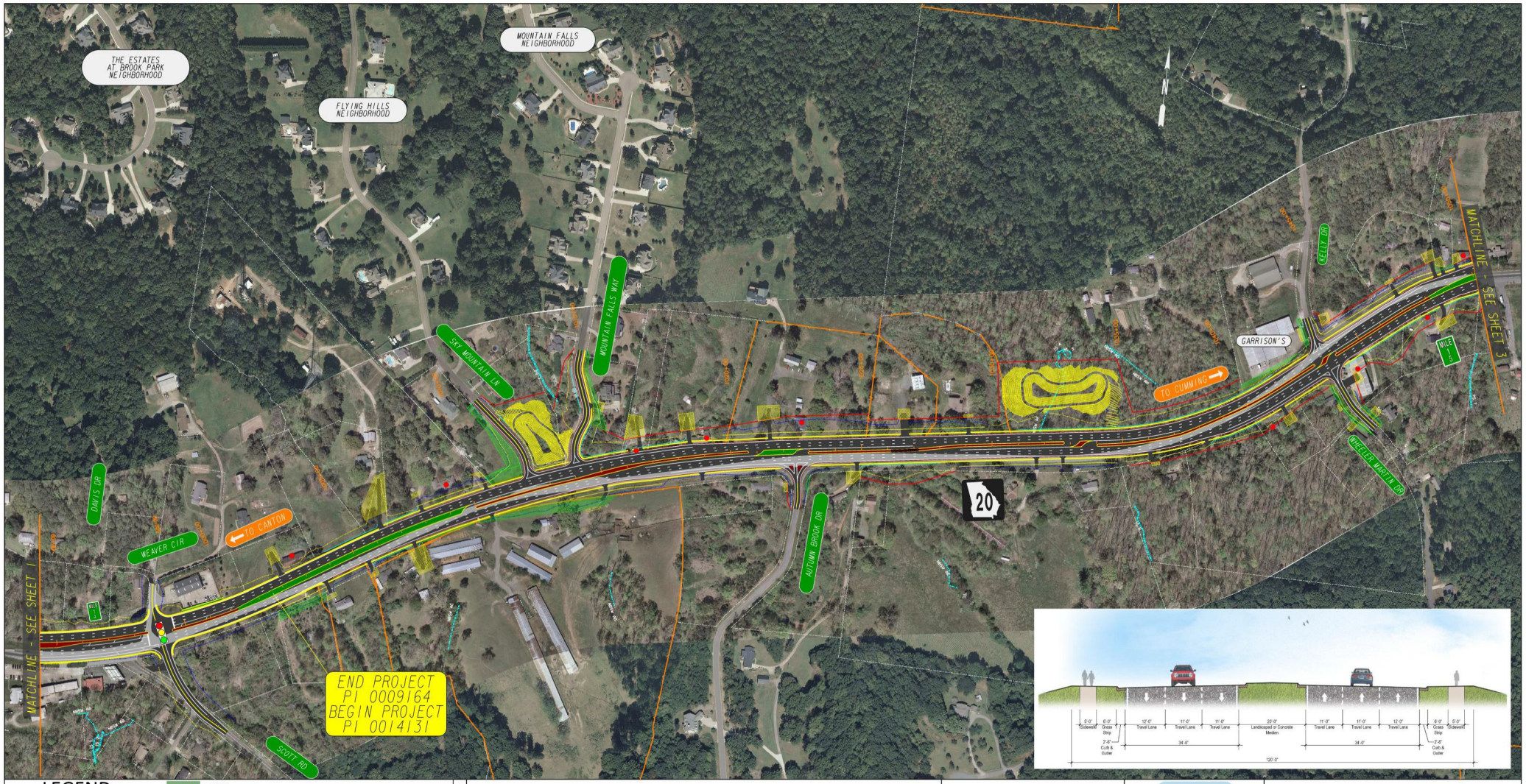
APPROVALS

Concur: Hial Bittl
Director of Engineering

Approve: Margaret B. Pikl 11/9/17
Chief Engineer Date

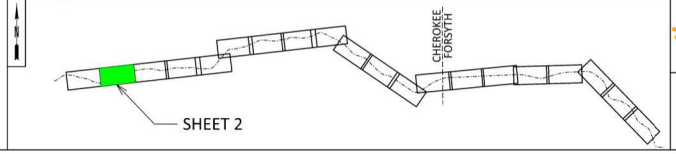
Attachment 1

Concept Layout



LEGEND

- HISTORIC RESOURCES
- STREAMS/WETLANDS
- REQUIRED RIGHT-OF-WAY (R/W)
- DRIVEWAY EASEMENT
- PERMANENT EASEMENT
- POTENTIAL DISPLACEMENT
- EXIST. PROPERTY & R/W
- LIMITS
- EXISTING PAVEMENT
- PROPOSED PAVEMENT
- PAVED MEDIAN
- GRASSED MEDIAN
- CURB AND GUTTER
- SIDEWALK
- WALL/BARRIER
- GUARDRAIL
- CEMETERY
- SCHOOL
- CHURCH
- EXISTING TRAFFIC SIGNAL
- POTENTIAL POND
- FLUSH MEDIAN



Georgia Department of Transportation

AECOM

SR20 IMPROVEMENTS CANTON TO CUMMING

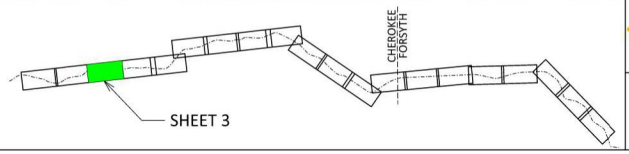
SR 20 - CORRIDOR IMPROVEMENTS PROPOSED ALIGNMENT

SCALE IN FEET 0 100 200 400

SHEET 2

LEGEND

- HISTORIC RESOURCES
- STREAMS/WETLANDS
- REQUIRED RIGHT-OF-WAY (R/W)
- DRIVEWAY EASEMENT
- PERMANENT EASEMENT
- POTENTIAL DISPLACEMENT
- EXIST. PROPERTY & R/W
- LIMITS
- EXISTING PAVEMENT
- PROPOSED PAVEMENT
- PAVED MEDIAN
- GRASSED MEDIAN
- CURB AND GUTTER
- SIDEWALK
- WALL/BARRIER
- GUARDRAIL
- CEMETERY
- SCHOOL
- CHURCH
- EXISTING TRAFFIC SIGNAL
- POTENTIAL POND



Georgia Department of Transportation

AECOM

SR20 IMPROVEMENTS
CANTON TO CUMMING

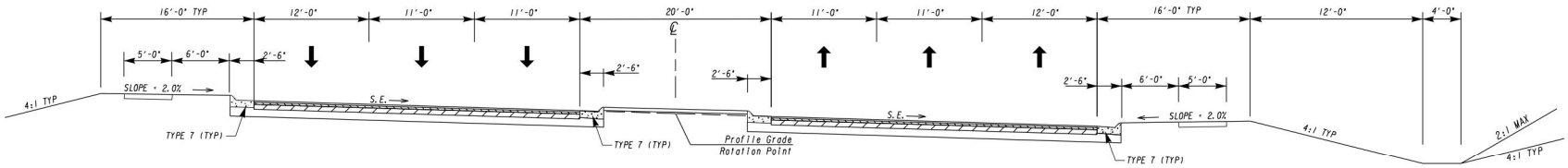
SR 20 - CORRIDOR IMPROVEMENTS
PROPOSED ALIGNMENT

SCALE IN FEET
0 100 200 400

SHEET 3

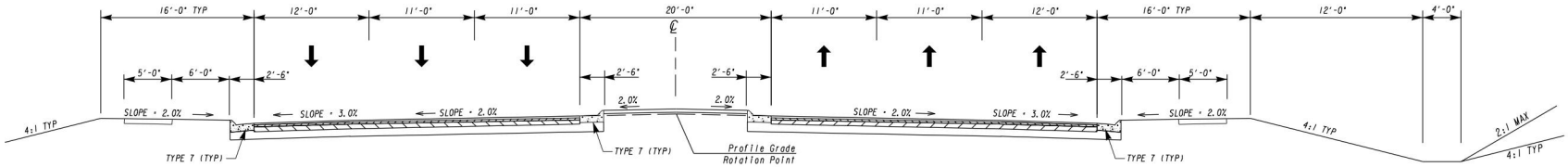
Attachment 2

Typical Sections



SUPERELEVATION

6 LANE, 20' RAISED MEDIAN



NORMAL CROWN

6 LANE, 20' RAISED MEDIAN

AECOM

NOT TO SCALE

REVISION DATES

TYPICAL SECTIONS

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		05-001
CORRECTED:		DATE:		
VERIFIED:		DATE:		

Attachment 3

Detailed Cost Estimates

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P.I. No. **0014131** **OFFICE** Program Delivery

PROJECT DESCRIPTION
SR 20 from CR 281/Scott Rd to CR 762/Union Hill Rd

DATE August 24, 2017

From: Albert V. Shelby, State Program Delivery Engineer

To: Lisa L. Myers, State Project Review Engineer
via Email Mailbox: **CostEstimatesandUpdates@dot.ga.gov**

Subject: REVISIONS TO PROGRAMMED COSTS

PROJECT MANAGER Cleopatra James

MGMT LET DATE 7/15/2019

MGMT ROW DATE 7/17/2017

PROGRAMMED COSTS (TPro W/OUT INFLATION)			**LAST ESTIMATE UPDATE**	
CONSTRUCTION	$	13,230,000.00	DATE	9/2/2016
RIGHT OF WAY	$	12,883,050.00	DATE	9/2/2016
UTILITIES	$		DATE	

REVISED COST ESTIMATES

CONSTRUCTION*	$	22,320,761.26
RIGHT OF WAY	$	13,967,000.00
UTILITIES	$	1,975,000.00

*Cost Contains 5 % Contingency

REASONS FOR COST INCREASE AND CONTINGENCY JUSTIFICATION:

The increase in construction costs was due to the previous estimate beign based on 4 lanes instead of 6 lanes, rural shoulders instead of urban shoulders, open systems instead of closed drainage systems, and the addition of full depth paving and MS4 basins. A 5% contingency was added to the Construction estimate for risk. At the time of the last update, utilities information was not available and the current estimate is based on the best available information at the current stage. The ROW cost increase is based on a more thorough review of the current plans.

CONTINGENCY SUMMARY

A.	**CONSTRUCTION COST ESTIMATE:**	$ 19,475,115.81	Base Estimate From CES		
B.	**ENGINEERING AND INSPECTION (E & I):**	$ 973,755.79	Base Estimate (A) x	5	%
C.	**CONTINGENCY:**	$ 1,022,443.58	Base Estimate (A) + E & I (B) x	5	%
			See % Table in "Risk Based Cost Estimation" Memo		
D.	**TOTAL LIQUID AC ADJUSTMENT:**	$ 849,446.08	Total From Liquid AC Spreadsheet		
E.	**CONSTRUCTION TOTAL:**	$ **22,320,761.26**	(A + B + C + D = E)		

REIMBURSABLE UTILTY COSTS

UTILITY OWNER	REIMBURSABLE COST
Southern Company (GPC Distribution)	$ 1,975,000.00
TOTAL	**$ 1,975,000.00**

ATTACHMENTS: (File Copy in the Project Cost Estimate Folder)

Detailed Cost Estimate Printout
Liquid AC Adjustment Spreadsheet

PROJ. NO.	N/A	CALL NO.	0/00/2016
P.I. NO.	0014131		
DATE	8/24/2017		

INDEX (TYPE)	**DATE**	**INDEX**
REG. UNLEADED	Aug-17	$ 2.185
DIESEL		$ 2.457
LIQUID AC		$ 361.00

Link to AC Index:
http://www.dot.ga.gov/PS/Materials/AsphaltFuelIndex

LIQUID AC ADJUSTMENTS

PA=[((APM-APL)/APL)]xTMTxAPL

Asphalt

Price Adjustment (PA)				**827368.68**	**$ 827,368.68**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	577.60	
Monthly Asphalt Cement Price month project let (APL)			$	361.00	
Total Monthly Tonnage of asphalt cement (TMT)				3819.8	

ASPHALT	**Tons**	**%AC**	**AC ton**
Leveling	2000	5.0%	100
12.5 OGFC		5.0%	0
12.5 mm	10435	5.0%	521.75
9.5 mm SP		5.0%	0
25 mm SP	50410	5.0%	2520.5
19 mm SP	13551	5.0%	677.55
	76396		**3819.8**

BITUMINOUS TACK COAT

Price Adjustment (PA)			**$**	**22,077.40**	**$ 22,077.40**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	577.60	
Monthly Asphalt Cement Price month project let (APL)			$	361.00	
Total Monthly Tonnage of asphalt cement (TMT)				101.92704	

Bitum Tack Gals	gals/ton	tons
23731	232.8234	101.92704

BITUMINOUS TACK COAT (surface treatment)

Price Adjustment (PA)				**0**	**$ -**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	577.60	
Monthly Asphalt Cement Price month project let (APL)			$	361.00	
Total Monthly Tonnage of asphalt cement (TMT)				0	

Bitum Tack	SY	Gals/SY	Gals	gals/ton	tons
Single Surf. Trmt.		0.20	0	232.8234	0
Double Surf.Trmt.		0.44	0	232.8234	0
Triple Surf. Trmt		0.71	0	232.8234	0
					0

TOTAL LIQUID AC ADJUSTMENT	**$ 849,446.08**

JOB ESTIMATE REPORT

JOB NUMBER : 0014131 SPEC YEAR: 13
DESCRIPTION: SR 20 FROM CR 281/SCOTT RD TO CR 762/UNION HILL RD

ITEMS FOR JOB 0014131

LINE	ITEM	ALT	UNITS	DESCRIPTION	QUANTITY	PRICE	AMOUNT
0005	150-1000		LS	TRAFFIC CONTROL - 0014131	1.000	1500000.00	1500000.00
0010	150-5010		EA	TRAF CTRL,PORTABLE IMPACT ATTN	17.000	7788.52	132404.92
0015	153-1300		EA	FIELD ENGINEERS OFFICE TP 3	1.000	95413.10	95413.10
0019	201-1500		LS	CLEARING & GRUBBING - 0014131	1.000	1733600.00	1733600.00
0020	205-0001		CY	UNCLASS EXCAV	283754.000	6.51	1848084.13
0039	310-1101		TN	GR AGGR BASE CRS, INCL MATL	119099.000	21.75	2590928.48
0040	402-1812		TN	RECYL AC LEVELING,INC BM&HL	2000.000	80.00	160000.00
0045	402-3121		TN	RECYL AC 25MM SP,GP1/2,BM&HL	50410.000	80.00	4032800.00
0050	402-4510		TN	RECYL AC 12.5 MM SP,GP2ONLY,INC P-MBM&HL	10435.000	80.00	834800.00
0055	402-3190		TN	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	13551.000	80.00	1084080.00
0060	413-0750		GL	TACK COAT	23731.000	2.57	60988.67
0065	441-0016		SY	DRIVEWAY CONCRETE, 6 IN TK	892.000	39.93	35624.31
0070	441-0018		SY	DRIVEWAY CONCRETE, 8 IN TK	89.000	51.54	4587.63
0075	441-0104		SY	CONC SIDEWALK, 4 IN	2141.000	37.50	80306.32
0080	441-0740		SY	CONC MEDIAN, 4 IN	11107.000	23.11	256720.98
0085	441-4020		SY	CONC VALLEY GUTTER, 6 IN -	1288.000	39.36	50707.53
0090	441-6740		LF	CONC CURB & GUTTER/ 8X30 TP7 -	44389.000	12.78	567709.56
0095	620-0100		LF	TEMP BARRIER, METHOD NO. 1 -	19700.000	24.12	475202.61
0100	621-4060		LF	CONCRETE SIDE BARRIER, TY 6 -	100.000	240.00	24000.00
0105	621-4061		LF	CONCRETE SIDE BARRIER, TY 6A -	150.000	257.28	38592.00
0110	621-4062		LF	CONCRETE SIDE BARRIER, TY 6B -	150.000	240.00	36000.00
0115	621-4063		LF	CONCRETE SIDE BARRIER, TY 6C -	125.000	747.69	93461.25
0120	634-1200		EA	RIGHT OF WAY MARKERS -	246.000	108.11	26597.18
0125	641-1100		LF	GUARDRAIL, TP T -	88.000	69.50	6116.21
0130	641-1200		LF	GUARDRAIL, TP W -	7157.000	17.56	125722.08
0135	641-5001		EA	GUARDRAIL ANCHORAGE, TP 1 -	63.000	811.07	51097.62
0140	641-5020		EA	GUARDRL, ANCHOR, TP 12B,31 IN, FLR, E/A -	4.000	2420.33	9681.32
0145	643-8200		LF	BARRIER FENCE (ORANGE), 4 FT -	5000.000	1.64	8213.00
0150	206-0002		CY	BORROW EXCAV, INCL MATL -	25000.000	7.25	181496.75
0155	441-0204		SY	PLAIN CONC DITCH PAVING, 4 IN -	2500.000	34.52	86320.48
0160	550-1180		LF	STM DR PIPE 18,H 1-10 -	12100.000	37.42	452839.48
0165	550-1240		LF	STM DR PIPE 24,H 1-10 -	638.000	53.76	34303.79
0170	550-1360		LF	STM DR PIPE 36,H 1-10 -	250.000	76.96	19241.51
0175	550-2180		LF	SIDE DR PIPE 18,H 1-10 -	5600.000	27.89	156207.41
0180	550-3418		EA	SAFETY END SECTION 18,SD,4:1 -	112.000	321.95	36059.40
0185	550-4218		EA	FLARED END SECT 18 IN, ST DR -	1.000	637.12	637.13
0190	550-4224		EA	FLARED END SECT 24 IN, ST DR -	4.000	737.03	2948.15
0195	550-4236		EA	FLARED END SECT 36 IN, ST DR -	2.000	1248.51	2497.03
0200	600-0001		CY	FLOWABLE FILL -	25.000	254.33	6358.27
0205	668-1100		EA	CATCH BASIN, GP 1 -	69.000	2442.07	168503.26
0210	668-1110		LF	CATCH BASIN, GP 1, ADDL DEPTH -	100.000	203.01	20301.68

JOB ESTIMATE REPORT

0215	668-2100	EA	DROP INLET, GP 1 -	3.000	2156.67	6470.03
0220	668-2110	LF	DROP INLET, GP 1, ADDL DEPTH -	75.000	195.60	14670.03
0225	668-4300	EA	STORM SEW MANHOLE, TP 1 -	1.000	2194.01	2194.02
0230	999-3110	EA	DETENTION POND -	7.000	88000.00	616000.00
0235	163-0232	AC	TEMPORARY GRASSING -	18.000	698.42	12571.66
0240	163-0240	TN	MULCH -	676.000	173.61	117362.59
0245	163-0300	EA	CONSTRUCTION EXIT -	14.000	1351.37	18919.21
0250	163-0503	EA	CONSTR AND REMOVE SILT CONTROL GATE,TP 3 -	56.000	377.89	21162.10
0255	163-0520	LF	CONSTR AND REMOVE TEMP PIPE SLOPE DRAIN -	1500.000	13.84	20770.83
0260	163-0527	EA	CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG -	563.000	289.52	163002.94
0265	163-0531	EA	CONSTR & REM SEDIMENT BASIN,TP 1,STA NO- 7 LOCATIONS	7.000	13732.28	96126.01
0270	163-0550	EA	CONS & REM INLET SEDIMENT TRAP -	73.000	141.81	10352.84
0275	165-0030	LF	MAINT OF TEMP SILT FENCE, TP C -	14500.000	0.63	9212.00
0280	165-0041	LF	MAINT OF CHECK DAMS - ALL TYPES -	5630.000	2.18	12302.00
0285	165-0060	EA	MAINT OF TEMP SEDIMENT BASIN,STA NO - -	7.000	1361.34	9529.39
0290	165-0087	EA	MAINT OF SILT CONTROL GATE, TP 3 -	56.000	55.19	3091.11
0295	165-0101	EA	MAINT OF CONST EXIT -	14.000	586.35	8208.96
0300	165-0105	EA	MAINT OF INLET SEDIMENT TRAP -	73.000	53.23	3885.79
0305	167-1000	EA	WATER QUALITY MONITORING AND SAMPLING -	8.000	400.10	3200.82
0310	167-1500	MO	WATER QUALITY INSPECTIONS -	24.000	456.63	10959.23
0315	171-0030	LF	TEMPORARY SILT FENCE, TYPE C -	29000.000	3.20	93035.77
0320	603-2181	SY	STN DUMPED RIP RAP, TP 3, 18 -	180.000	47.83	8610.52
0325	603-7000	SY	PLASTIC FILTER FABRIC -	180.000	4.66	840.09
0330	700-6910	AC	PERMANENT GRASSING -	48.000	1039.82	49911.55
0335	700-7000	TN	AGRICULTURAL LIME -	138.000	106.07	14638.39
0340	700-8000	TN	FERTILIZER MIXED GRADE -	48.000	535.15	25687.27
0345	700-8100	LB	FERTILIZER NITROGEN CONTENT -	2400.000	2.18	5234.86
0350	710-9000	SY	PERM SOIL REINFORCING MAT -	2306.000	3.66	8439.96
0355	716-2000	SY	EROSION CONTROL MATS, SLOPES -	109000.000	0.81	88530.89
0360	636-1033	SF	HWY SIGNS, TP1MAT,REFL SH TP 9 -	230.000	19.59	4507.10
0365	636-1036	SF	HWY SGN,TP1MAT,REFL SH TP 11 -	1080.000	21.41	23122.80
0370	636-1072	SF	HWY SIGNS,ALUM EXTRD PNLS, RS TP 3 -	147.000	25.54	3755.27
0375	636-2070	LF	GALV STEEL POSTS, TP 7 -	730.000	7.68	5610.84
0380	636-2090	LF	GALV STEEL POSTS, TP 9 -	1478.000	6.28	9291.51
0385	636-3000	LB	GALV STEEL STR SHAPE POST -	977.000	5.27	5148.79
0390	639-2002	LF	STEEL WIRE STRAND CABLE, 3/8 -	107.000	11.11	1189.77
0395	639-4003	EA	STRAIN POLE, TP III -	4.000	7080.45	28321.81
0400	653-0110	EA	THERM PVMT MARK, ARROW, TP 1 -	3.000	69.63	208.92
0405	653-0120	EA	THERM PVMT MARK, ARROW, TP 2 -	67.000	75.69	5071.49
0410	653-0130	EA	THERM PVMT MARK, ARROW, TP 3 -	10.000	112.24	1122.45
0415	653-0170	EA	THERM PVMT MARK, ARROW, TP 7 -	12.000	106.62	1279.52
0420	653-0400	EA	THERM PVMT MARK, WORD, TP 21 -	3.000	316.00	948.00
0425	653-1501	LF	THERMO SOLID TRAF ST 5 IN, WHI -	30931.000	0.41	12779.14
0430	653-1502	LF	THERMO SOLID TRAF ST, 5 IN YEL -	20355.000	0.40	8294.87
0435	653-1704	LF	THERM SOLID TRAF STRIPE,24,WH -	48.000	8.36	401.76
0440	653-1804	LF	THERM SOLID TRAF STRIPE, 8,WH -	862.000	2.69	2320.05
0445	653-3501	GLF	THERMO SKIP TRAF ST, 5 IN, WHI -	41016.000	0.22	9112.11
0450	653-6004	SY	THERM TRAF STRIPING, WHITE -	1767.000	3.84	6793.21

DATE : 08/18/2017
PAGE : 3

JOB ESTIMATE REPORT

0455	653-6006	SY	THERM TRAF STRIPING, YELLOW -	173.000	4.34	751.63
0460	654-1001	EA	RAISED PVMT MARKERS TP 1 -	120.000	4.46	535.54
0465	654-1003	EA	RAISED PVMT MARKERS TP 3 -	627.000	4.25	2666.18
0470	647-1000	LS	TRAF SIGNAL INSTALLATION NO - UNION HILL ROAD	1.000	125000.00	125000.00
0475	626-0602	LF	TRAFFIC BARRIER, H -	390.000	150.00	58500.00
0480	627-1020	SF	MSE WALL FACE, 20 - 30 FT HT, WALL NO - -	5500.000	47.06	258860.64
0485	627-1030	SF	MSE WALL FACE, GTR 30 FT HT, WALL NO - -	6800.000	46.09	313448.31

ITEM TOTAL	19475115.81
INFLATED ITEM TOTAL	19475115.81

TOTALS FOR JOB 0014131

ESTIMATED COST:	19475115.81
CONTINGENCY PERCENT (0.0):	0.00
ESTIMATED TOTAL:	19475115.81

GEORGIA DEPARTMENT OF TRANSPORTATION
PRELIMINARY ROW COST ESTIMATE SUMMARY

Date: 6/13/2017 Project:
Revised: County: Cherokee
PI: 14131
Description: Widening of SR 20 from CR 281/Scott Rd to CR 762/Union Hill Rd
Project Termini:

Existing ROW: Varies
Parcels: 101 Required ROW: Varies

Land and Improvements		$10,013,100.00
Proximity Damage	*$30,000.00*	
Consequential Damage	*$275,000.00*	
Cost to Cures	*$100,000.00*	
Trade Fixtures	*$150,000.00*	
Improvements	*$1,522,400.00*	
Valuation Services		$442,500.00
Legal Services		$668,175.00
Relocation		$1,357,250.00
Demolition		$561,000.00
Administrative		$924,500.00
TOTAL ESTIMATED COSTS		$13,966,525.00
TOTAL ESTIMATED COSTS (ROUNDED)		***$13,967,000.00***

Preparation Credits	Hours	Signature
Jared Estes	15	

Prepared By: Wesley K. Brock Wesley K. Brock CG#: 5147 (DATE) 6/13/17
Approved By: Eric K. Murray CG#: 6545 (DATE) 6/21/17 Revised 6/19/17

NOTE: No Market Appreciation is included in this Preliminary Cost Estimate

February 22, 2017

AECOM
Mr. Scot Gero
Project Manager
1360 Peachtree Street, Suite 500
Atlanta, GA 30309

Cardno

6649 Peachtree Industrial Blvd
Suite I
Peachtree Corners, GA 30092
USA

Phone: +1 678 421 0080
Fax: +1 770 421 0082

www.cardno.com

RE: PI: 00014131-SR 20 Corridor Widening (Cherokee County)

Dear Mr. Gero:

Please find below the Preliminary Cost Estimate for each utility owner with facilities potentially located within the project limits:

FACILITY OWNER	REIMBURSABLE	NON-REIMBURSABLE	TOTAL
Southern Company (GPC Distribution)	$1,975,000.00	$0.00	**$1,975,000.00**
Sawnee EMC (SEMC)	$0.00	$0.00	**$0.00**
Southern Company (AGL)	$0.00	$117,340.00	**$117,340.00**
AT&T Telecommunications (ATT)	$0.00	$0.00	**$0.00**
Crown Castle (Sunesys (SUN))	$0.00	$272,000.00	**$272,000.00**
Windstream Communications (WST)	$0.00	$446,000.00	**$446,000.00**
Comcast Communications/CATV	$0.00	$160,000.00	**$160,000.00**
Cherokee County Water	$0.00	$181,110.00	**$181,110.00**
Cherokee County Sewer	$0.00	$0.00	**$0.00**
TOTAL	**$1,975,000.00**	**$1,176,450.00**	**$3,151,450.00**

This estimate which was prepared by Venesia Horne, our Sr. Utility Coordinator, is based upon the current information and is preliminary. Cost are subject to change as plans and designs are developed further.

If you have any questions please feel free to call.

Sincerely,

Brandan Crawford

Brandan Crawford
Project Manager

Table 7: Cumulative impacts to field-delineated waters from I-575 to N Corners Pkwy along Alignment 2. Widen Existing within currently proposed construction limits

Area of Design Influence	Feature	HUC	PI #	Length of impact (ft)	Area of impact (ac)
N/A	IS 1	03150104	0009164	95	
1	PS 17	03150104	0014132	49	
2	IS 37	03150104	0014132	11	
2	WL 38	03150104	0014132		0.001
3	PS 40	03150104	0014133	10	
4	PS 43	03150104	0014133	123	
4	PS 45	03150104	0014133	86	
5	WL 59	03150104	0002862		0.01
5	IS 60	03150104	0002862	209	
5	PS 62	03150104	0002862	143	
6	IS 70	03150104	0002862	72	
6	IS 76	03150104	0002862	135	
6	OW 75	03150104	0002862		0.013
7	PS 78	03130001	0002862	162	
7	PS 79	03130001	0002862	332	
7	IS 80	03130001	0002862	534	
8	IS 81	03130001	0002862	80	
9	IS 84	03150104	0002862	26	
10	IS 85	03150104	0002862	84	
10	WL 86	03150104	0002862		0.017
10	OW 87	03150104	0002862		0.054
11	IS 89	03130001	0003682	115	
12	IS 100	03130001	0003682	131	
12	PS 102	03130001	0003682	173	
12	PS 103	03130001	0003682	143	
12	IS 105	03130001	0003682	56	
12	IS 106	03130001	0003682	43	
12	PS 107	03130001	0003682	174	
12	PS 108	03130001	0003682	106	
12	PS 109	03130001	0003682	305	
12	WL 110	03130001	0003682		0.03
12	IS 111	03130001	0003682	146	
12	IS 112	03130001	0003682	191	
12	IS 113	03130001	0003682	85	
12	IS 114	03130001	0003682	80	
12	WL 115	03130001	0003682		0.005
13	PS 121	03130001	0003682	95	
TOTAL		03150104		1043	0.095
TOTAL		03130001		2951	0.035

WORKSHEET 1: ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Intermittent 0.1			Perennial Stream > 15' in width 0.4			Perennial Stream ≤ 15' in width 0.8		
Priority Area	Tertiary 0.5			Secondary 0.8			Primary 1.5		
Existing Condition	Fully Impaired 0.25			Somewhat Impaired 0.5			Fully Functional 1.0		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.2		
Dominant Impact	Shade/ Clear 0.05	Utility X-ing 0.4	Bank Armor 0.7	Deten-tion 1.5	Stream Crossing (≤ 100') 1.7	Impound 2.7	Morpho-logic Change 2.7	Pipe >100' 3.0	Fill 3.0
Scaling Factor (Based on # linear feet impacted)	< 100' impact 0	100-200' impact 0.05	201-500' impact 0.1	501-1000' impact 0.2	> 1000' impact 0.4 for each 1000' feet of impact (round impacts to the nearest 1000') (example: 2,200' of impact – scaling factor = 0.8; 2,800' of impact – scaling factor – 1.2)				

Reaches to Be Impacted	**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
	Complete the Following for Each Reach to Be Impacted			
Simon Channel Evolution Stage				
Rosgen Stream Type/D50				
Criteria for Selecting Existing Condition for Each Reach				
Bankfull Width and Depth	Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)				
Factors	**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
Stream Type Impacted	0.1	0.8		
Priority Area	1.5	1.5		
Existing Condition	0.5	0.5		
Duration	0.2	0.2		
Dominant Impact	1.7	1.7		
Scaling Factor	0.8	0.8		
Sum of Factors M =	4.8	5.5		
Feet Stream in Reach Impacted LF =	1387.91	1553.47		
M X LF =	6662	8544		

Total Mitigation Credits Required = (M X LF) = ____17206_____

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

ADVERSE IMPACT FACTORS

Factor	Options						
Dominant Effect	Fill 2.0	Dredge 1.8	Impound 1.6	Drain 1.4	Flood 1.2	Clear 1.0	Shade 0.5
Duration of Effects	7+ years 2.0	5-7 years 1.5	3-5 years 1.0	1-3 years 0.5	< 1 year 0.1		
Existing Condition	Class 1 2.0	Class 2 1.5	Class 3 1.0	Class 4 0.5	Class 5 0.1		
Lost Kind	Kind A 2.0	Kind B 1.5	Kind C 1.0	Kind D 0.5	Kind E 0.1		
Preventability	High 2.0	Moderate 1.0	Low 0.5	None 0			
Rarity Ranking	Rare 2.0	Uncommon 0.5	Common 0.1				

† These factors are determined on a case-by-case basis.

REQUIRED MITIGATION CREDITS WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Dominant Effect	2.0					
Duration of Effect	2.0					
Existing Condition	1.0					
Lost Kind	1.5					
Preventability	1.0					
Rarity Ranking	0.1					
Sum of r Factors	R_1 = 7.6	R_2 =	R_3 =	R_4 =	R_5 =	R_6 =
Impacted Area	AA_1 = 0.029	AA_2 =	AA_3 =	AA_4 =	AA_5 =	AA_6 =
R × AA =	0.22					

Total Required Credits = Σ (R × AA) = 0.22

WORKSHEET 1: ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Intermittent 0.1			Perennial Stream > 15' in width 0.4			Perennial Stream ≤ 15' in width 0.8		
Priority Area	Tertiary 0.5			Secondary 0.8			Primary 1.5		
Existing Condition	Fully Impaired 0.25			Somewhat Impaired 0.5			Fully Functional 1.0		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.2		
Dominant Impact	Shade/ Clear 0.05	Utility X-ing 0.4	Bank Armor 0.7	Deten-tion 1.5	Stream Crossing (≤ 100') 1.7	Impound 2.7	Morpho-logic Change 2.7	Pipe >100' 3.0	Fill 3.0
Scaling Factor (Based on # linear feet impacted)	< 100' impact 0	100-200' impact 0.05	201-500' impact 0.1	501-1000' impact 0.2	> 1000' impact 0.4 for each 1000' feet of impact (round impacts to the nearest 1000') (example: 2,200' of impact – scaling factor = 0.8; 2,800' of impact – scaling factor – 1.2)				

Reaches to Be Impacted	**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
	Complete the Following for Each Reach to Be Impacted			
Simon Channel Evolution Stage				
Rosgen Stream Type/D50				
Criteria for Selecting Existing Condition for Each Reach				
Bankfull Width and Depth	Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)				
Factors	**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
Stream Type Impacted	0.1	0.8	0.4	
Priority Area	1.5	1.5	1.5	
Existing Condition	0.5	0.5	0.5	
Duration	0.2	0.2	0.2	
Dominant Impact	1.7	1.7	1.7	
Scaling Factor	0.8	0.8	0.8	
Sum of Factors M =	4.8	5.5	5.1	
Feet Stream in Reach Impacted LF =	665.20	451.71	89.73	
M X LF =	3193	2484	458	

Total Mitigation Credits Required = (M X LF) = __6135_____

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

ADVERSE IMPACT FACTORS

Factor	Options						
Dominant Effect	Fill 2.0	Dredge 1.8	Impound 1.6	Drain 1.4	Flood 1.2	Clear 1.0	Shade 0.5
Duration of Effects	7+ years 2.0	5-7 years 1.5	3-5 years 1.0	1-3 years 0.5	< 1 year 0.1		
Existing Condition	Class 1 2.0	Class 2 1.5	Class 3 1.0	Class 4 0.5	Class 5 0.1		
Lost Kind	Kind A 2.0	Kind B 1.5	Kind C 1.0	Kind D 0.5	Kind E 0.1		
Preventability	High 2.0	Moderate 1.0	Low 0.5	None 0			
Rarity Ranking	Rare 2.0	Uncommon 0.5	Common 0.1				

† These factors are determined on a case-by-case basis.

REQUIRED MITIGATION CREDITS WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Dominant Effect	2.0	2.0				
Duration of Effect	2.0	2.0				
Existing Condition	1.0	0.5				
Lost Kind	1.5	0.5				
Preventability	1.0	1.0				
Rarity Ranking	0.1	0.1				
Sum of r Factors	R_1 = 7.6	R_2 = 6.6	R_3 =	R_4 =	R_5 =	R_6 =
Impacted Area	AA_1 = 0.13	AA_2 = 0.07	AA_3 =	AA_4 =	AA_5 =	AA_6 =
R × AA =	0.99	0.46				

Total Required Credits = Σ (R × AA) = 1.45

Dunnahoo, Lindsey

From:	Crosby, John
Sent:	Wednesday, February 01, 2017 12:37 PM
To:	Dawood, Laura
Cc:	Covington, Christopher
Subject:	FW: Mitigation credits for SR 20
Attachments:	Stream worksheet.pdf; Wetland Worksheet.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

I just received a phone call from MRG. Wetland credits at their bank are permanently set at $50,000. Wetland credits will equal $84,000. Please let me know if you have any questions.

Thank you,

John Crosby
Scientist II
D: 864.234.3000 M: 404.275.8898
john.crosby@aecom.com

AECOM
10 Patewood Drive, Building VI, Suite 500, Greenville, South Carolina, 29615
F 864.234.3069
www.aecom.com

From: Crosby, John
Sent: Monday, January 30, 2017 1:51 PM
To: Dawood, Laura; Covington, Christopher
Cc: Wolfe, Kevin; Smith, William F
Subject: Mitigation credits for SR 20

Good afternoon,

I have attached the results of the mitigation calculation. The only wetland credits I have found within the service area are at the Etowah River Road bank (MRG bank 404-308-0662). No one answered the phone but I left a voice mail about the prices. We will need 1.68 wetland credits based on the shapefiles that I have. Stream credits will require 21,182 credits at 40 dollars a credit ($847,280). This was at Bannister Creek Mitigation Bank from Corblu. I spoke with Greg and he said it is likely that they would be available in 2019. They haven't sold many. Prices may change over time. Once the project gets in more of a final stage we can calculate impacts on a case by case scenario and that would minimize the credits. Please let me know if you have any questions. I will email again if MRG calls back.

Thank you,

John Crosby
Scientist II
D: 864.234.3000 M: 404.275.8898
john.crosby@aecom.com

Attachment 4

Traffic Study

4. PI 0014131 Traffic Study

Section 4 analyses existing and future traffic conditions for the PI 0014131 project corridor: consisting of SR-20 from Scott Road to Union Hill Road.

4.1 Existing Conditions

Section 4.1 describes character of intersections, existing traffic volumes, and current crash statistics along the PI 0014131 corridor.

4.1.1 Existing Transportation Facilities

Section 4.1.1 provides an overview of the existing major intersections along the project corridor. Most of the intersecting roadways in this project corridor are small neighborhood roads, with some limited business access and one school access point.

4.1.1.1 Union Hill Road

Union Hill Road is the second signalized intersection in PI 0014131, and also serves as the project endpoint. SR-20 currently expands to two lanes in each direction with a separated right, thru and left turn at this intersection. The current posted speed limit on Union Hill Road Road is 45 mph. There are no bicycle lanes on either of these roadways. Although Buffington Elementary School is located along SR-20 in this area, there is no school zone or speed limit reduction. Union Hill Road intersection provides connectivity from SR-20 to Evans Cook Road, Henson Way, and East Cherokee Drive which travels northeast-southwest. Union Hill Road intersection is located in an area expected to develop with various residential and some village-style commercial uses.

4.1.2 Existing Traffic Volumes

Existing traffic count data was collected by GCA, Inc. for GDOT under a separate contract in October 2011. Twenty-four hour traffic counts were collected at 30 points along the corridor. Vehicle classifications and peak turning count movements were collected at one location: Scott Road. Vehicle classification counts determine the relative proportions of cars, single-unit trucks and buses, and multi-unit or combination trucks utilizing the project corridor.

Plotted count locations provided by GCA, Inc. can be found in Appendix A. The existing traffic was utilized by GCA, Inc. to calculate K and D factors, truck percentages, and traffic growth rates as described in Section 4.2.1 of this report and Appendix B.

4.1.3 Corridor Safety Analysis

Safety is one of the most important aspects of any functioning corridor. This section describes data collection and analysis of crash data for the project corridor.

4.1.3.1 Crash Incidents

Total project corridor crash data was collected from the Georgia Electronic Accident Reporting System (GEARS)[1]. Crashes occurring between 2013 and 2015 were collected. County-level data was plotted using provided geographic coordinates, allowing for selection of project corridor incidents. Additional review of county-level crash data by street name ensured incidents

[1] Georgia Electronic Accident Reporting System (GEARS). Law enforcement reporting of traffic incidents in Georgia. Developed and maintained by Lexis Nexis on behalf of the Georgia Department of Transportation. https://www.gearsportal.com/Pages/Public/Home.aspx

along the corridor with incorrect or missing coordinate information were also included. The raw counts were parsed by injuries and/or fatalities and crash rates compared to statewide averages. The resulting crash incident summary for the project corridor is presented in Table 1.

Table 1. Crash incidents SR-20 between Scott Rd and Union Hill Rd

Year	Total			Injury			Fatal		
	# of crashes	Crashes per 100 MVM	State avg Crashes per 100 MVM	# of crashes	Crashes per 100 MVM	State avg Crashes per 100 MVM	# of crashes	Crashes per 100 MVM	State avg Crashes per 100 MVM
2013	46	283	686	10	62	142	1	6.15	1.29
2014	24	145	516	6	36	104	0	0.00	0.93
2015	36	213	n/a	4	24	n/a	0	0.00	n/a

Source: GCA, Inc. analysis of GEARS data

The total rate of crashes in the project corridor is lower than the rate statewide across all years. Injury crash rates are also lower than statewide averages across all years; however, the one fatal crash in the corridor creates a fatal crash rate per 100 MVM roughly five times the statewide average. The roadway improvements proposed by this project include a raised median, full median opening access only at signalized intersections, restricted median crossing U-turn access at moderately used un-signalized intersections, and indirect left access at low usage side streets and driveways. These improvements are expected to improve safety by reducing conflict points throughout the corridor.

4.2 Future Conditions

Section 4.2 describes the future traffic expected on the corridor, proposed design, and analysis of future corridor capacity after implementation of the proposed project along PI 0014131.

4.2.1 Traffic Forecast

Future traffic volumes were estimated by GCA, Inc. approved by GDOT and utilized by AECOM for a corridor capacity analysis.

4.2.1.1 Growth Rate Methodology

GCA Inc. estimated growth rates in April 2012 for the project corridor which were approved by GDOT. Linear regression analysis was performed by GCA, Inc. using the historical traffic count data. Using the equations, future year traffic volumes were generated and growth rates were calculated. The growth rates estimated by two of these sets of data are summarized below.

Table 2. PI 0014131 GDOT Approved Growth Rates

Scenario	Date Range	Growth Rate (%)
No Build	2011-2025	2.0
No Build	2025-2045	1.7
Build	2011-2025	3.4
Build	2025-2045	2.9

Source: GCA, Inc. Memorandum, Appendix B

The analysis by GCA, Inc. and approved by GDOT which generated these growth estimates is included in Appendix B.

4.2.1.2 Forecasted Volumes

The GDOT approved growth rates were applied to traffic in the opening and design years. This analysis estimates that the corridor will serve 31,900 vehicles per day by opening year 2025 and 56,900 vehicles per day in design year 2045.

All final projected volumes for the 2025 opening and 2045 design years are provided on traffic diagrams in Appendix C. These traffic volume diagrams were approved by GDOT, and include 2011 Existing Average Daily Traffic (ADT); 2011 Existing AM and PM Design Hour Volume (DHV); 2025 & 2045 ADT; 2025 AM and PM DHV; and 2045 AM and PM DHV.

4.2.1.3 Signal Warrants

Major intersections along the project corridor were assessed for new signalization using forecasted average daily traffic for 2025 Opening year Build Scenario. As shown in Table 3, none of the PI 0014131 corridor intersections are projected to require signals.

Table 3. PI 0014131 Signal Warrants, 2025 Opening Year Build Scenario

	2025 Opening Year Average Daily Traffic				GDOT Warrant 1A			GDOT Warrant 1B			
Intersection with SR-20	ADT Major Street (two way)	ADT Minor Street (one way)	5.6% of Major Street (two way)	5.6% of Minor Street (one way)	100%	70%	56%	100%	70%	56%	New Signal Warranted?
Autumn Brook Dr	31,225	175	1,749	10	NO	NO	NO	NO	NO	NO	NO
Forest Creek Dr	29,525	975	1,654	55	NO	NO	NO	NO	YES	NO	NO
Old Cumming Dr (East)	28,225	375	1,581	21	NO	NO	NO	NO	NO	NO	NO
Union Hill Rd/Harmony Rd	25,200	1,975	1,412	111	NO	NO	NO	YES	YES	YES	NO*

Source: GCA, Inc. Analysis,

**This location has an existing signal and does not need a new permit to be issued.*

4.2.2 Proposed Design

Previous alternatives analyses resulted in the decision to enhance the east-west mobility and safety of travelers in Cherokee and Forsyth Counties by improving SR-20. The project proposes a total of six lanes, with three travel lanes in each direction, separated by a raised median. The right of way required would range between 120 and 250 ft. This design of lanes and non-

signalized roadway access points has been utilized in the Capacity Analysis, and is described in more detail in Section 4.2.3.2.

4.2.3 Capacity Analysis

This analysis allows comparison of future traffic conditions associated with the proposed roadway design.

4.2.3.1 Background

The 2010 HCM defines Level of Service (LOS) in terms of average control delay per vehicle, which is composed of initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS A indicates operations with very low control delay, while LOS F describes operations with extremely high average control delay. Several factors affect the controlled delay for un-signalized intersections, such as availability and distribution of gaps in the conflicting traffic stream, critical gaps, and follow-up time for a vehicle in the queue. LOS in concept is visualized in Figure 5, and the various HCM LOS criteria are summarized in Table 4.

Figure 5. Level of Service (LOS) visualization, FDOT

Table 4. Level of Service Criteria

Level of Service	Average Control Delay (seconds per vehicle)	
	Signalized Intersection	**Un-signalized Intersection**
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	> 15.0 and ≤ 25.0
D	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	> 35.0 and ≤ 50.0
F	> 80.0	> 50.0

Source: 2010 Highway Capacity Manual

4.2.3.2 Synchro Model Parameters

AECOM utilized Syncho 9.0 software for the project corridor capacity analysis. Syncho uses HCM methodology to model traffic along a corridor and then assigns LOS values to corridor intersections. The current roadway physical design was utilized for the 2011 Existing year model. The proposed design of a total of six lanes, with three travel lanes in each direction, separated by a raised median was applied for the 2025 Opening and 2045 Design year models.

Innovative intersection improvements were applied throughout the corridor. These improvements included numerous Restricted Crossing U-Turns (RCUT) as well as Median U-Turn Intersections (MUT) to improve safety.

Currently existing timing plans, typically running free, were utilized in the 2011 Existing year Synchro model. Signal timing was optimized at a 150 second cycle for the 2025 Opening year and 2045 Design year models. Splits were optimized in these plans.

Due to the limited turning movement counts collected in the project corridor, AECOM determined that peak hour factors should be estimated using all count locations, averaged and then applied throughout the entire project corridor from Scott Road to North Corners Parkway. These peak hour factors were calculated for left, right and thru movements on both the mainline and side streets as shown in Table 5, then utilized in Synchro. The data from which these factors were calculated can be found in Appendix D.

Table 5. Peak Hour Factors utilized in Synchro Capacity Analysis

	Average Peak Hour Factor	
Movement	**AM**	**PM**
Mainline Thru	0.86	0.91
Mainline Left	0.66	0.70
Mainline Right	0.65	0.76
Sidetreet Thru	0.57	0.67
Sidestreet Left	0.69	0.74
Sidestreet Right	0.68	0.68

Source: AECOM Analysis, Appendix D

Truck percentages calculated by GCA, Inc. were utilized for each corridor by project number. For PI 0014131, existing truck 24-hour truck percentage was approximately six percent: with four percent single-unit trucks and two percent of tractor trailers. For PI 0014131, average peak hour truck percentage of four percent: with three percent of single-unit trucks and one percent of tractor trailers. The following truck percentages were used in 2025 Opening and 2045 Design year models.

24-hour Truck volumes = 16%, Single-Unit = 10%, Combination = 6%
Peak hour Truck volumes = 12.5%, Single-Unit = 7.5%, Combination = 5%

A more detailed explanation of the GCA, Inc. analysis resulting in these percentages is included in Appendix B.

4.2.3.3 Capacity Analysis Results

Section 4.2.3.3 provides a summary of the capacity analysis results in terms of intersection level of service and intersection time delay.

Table 6. PI 0014131 AM Peak Hour Capacity Analysis by Intersection: Existing 2011, and Opening Year 2025, Design Year 2045

		No Build AM 2011 Existing Year		No Build AM 2025 Opening Year		Build AM 2025 Opening Year		No Build AM 2045 Design Year		Build AM 2045 Design Year	
Intersection with SR-20	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Sky Mountain Lane†	Stop, SB	D	27.5	E	39.0	C	18.7	F	138.2	F	69.3
Mountain Falls Way†	Stop, SB	D	28.0	E	47.4	C	17.9	F	174.6	E	49.5
Autumn Brook Drive	Stop, NB	D	33.6	E	48.1	B	14.2	F	228.7	D	25.6
Roper Trail	Stop, NB	D	28.3	E	46.2	B	14.1	F	169.6	C	24.4
Kelly Drive†	Stop, NB	F	78.1	F	>300.0	B	14.3	F	>300.0	D	28.0
	Stop, SB†	F	104.1	F	>300.0	C	17.7	F	>300.0	F	50.7
Lawson Road	Stop, NB	D	28.9	E	46.6	B	13.9	F	169.6	C	23.5
Forest Creek Drive†	Stop, NB	F	107.6	F	>300.0	C	19.6	F	>300.0	F	239.1
Old Cumming Drive (West)†	Stop, SB	C	21.5	D	32.3	C	19.2	F	103.5	F	88.9
Bagwell Lane	Stop, NB	D	25.8	E	40.5	C	15.3	F	120.2	D	31.2
Old Cumming Drive (East)†	Stop, SB	C	24.6	E	39.7	C	16.2	F	125.6	E	37.6
Cox Ct	Stop, NB	D	25.9	E	40.5	B	13.8	F	113.6	C	23.2
Buffington Elementary School†	Stop, NB	E	41.0	F	176.6	C	19.9	F	>300.0	F	270.3
Dobson Circle†	Stop, SB	D	28.8	E	48.1	C	17.8	F	>300.0	F	58.9
Union Hill Road/Harmony Drive	Signal	C	24.3	D	52.1	C	20.9	F	144.9	D	38.0

*Source: 2000 Highway Capacity Manual, GCA, Inc. Analysis, *HCS 2000*

As Table 6 shows, the PI 0014131 Build scenario is expected to provide a higher level of service and less delay than the No-Build scenario in both opening and design years.

Table 7. PI 0014131 PM Peak Hour Capacity Analysis by Intersection: Existing 2011, and Opening Year 2025, Design Year 2045

		No Build PM 2011 Existing Year		No Build PM 2025 Opening Year		Build PM 2025 Opening Year		No Build PM 2045 Design Year		Build PM 2045 Design Year	
Intersection with SR-20	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Sky Mountain Lane	Stop, SB	F	50.9	F	96.3	C	17.7	F	>300.0	E	45.7
Mountain Falls Way†	Stop, SB	E	42.3	F	84.5	C	18.2	F	>300.0	F	55.8
Autumn Brook Drive†	Stop, NB	E	47.4	F	150.2	C	19.6	F	>300.0	F	63.8
Roper Trail†	Stop, NB	E	49.7	F	107.6	C	19.4	F	>300.0	F	54.8
Kelly Drive†	Stop, NB	F	140.5	F	>300.0	C	19.3	F	>300.0	F	65.7
	Stop, SB	F	140.5	F	>300.0	C	17.7	F	>300.0	E	48.4
Lawson Road†	Stop, NB	E	47.1	F	159.4	C	19.0	F	>300.0	F	56.5
Forest Creek Drive†	Stop, NB	F	131.9	F	>300.0	C	22.1	F	>300.0	F	235.1
Old Cumming Drive (West)	Stop, SB	E	43.6	F	169.6	C	19.2	F	56.1	C	22.4
Bagwell Lane†	Stop, NB	E	37.6	F	68.6	C	18.5	F	>300.0	E	47.3
Old Cumming Drive (East)†	Stop, SB	D	33.1	F	70.2	C	18.7	F	>300.0	F	110.0
Cox Ct†	Stop, NB	E	35.9	F	63.5	C	16.9	F	>300.0	E	41.3
Buffington Elementary School†	Stop, NB	F	125.3	F	>300.0	D	27.9	F	>300.0	F	>300.0
Dobson Circle†	Stop, SB	D	29.8	F	53.0	C	17.3	E	45.6	E	47.3
Union Hill Road/Harmony Drive	Signal	C	28.4	E	60.5	C	27.0	F	206.2	D	48.5

*Source: 2000 Highway Capacity Manual, GCA, Inc. Analysis, *HCS 2000*

As Table 7 shows, the PI 0014131 Build scenario is expected to provide a higher level of service and less delay than the No-Build scenario in both opening and design years except in two cases: Buffington Elementary School and Dobson Circle. Buffington Elementary School driveway is expected to perform equally poorly in the design year No-Build and Build scenarios. Dobson Circle is expected to perform with 1.7 seconds more delay in the design year Build scenario than the No-Build scenario.

All intersections except Union Hill Road across the AM or PM periods experience LOS E or LOS F in the design year. These intersections are marked with a dagger (†) in Tables 6 and 7. Two main engineering mitigation actions were considered to improve these results: signals and additional turn lanes.

4.2.3.4 Mitigation Actions

The potential for a new signal at failing intersections was assessed at a planning level using standards set by the U.S. Department of Transportation Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). No intersection in PI 0014131 with expected poor LOS meets these planning-level signal warrants.

Although additional turn lanes were considered for the other intersections predicted to perform poorly, we do not consider these values to be highly concerning to the project. Highway Capacity Software used in this analysis assumes consistent headways between vehicles, whereas in the real world vehicle tend to travel in platoons. These platoons enable vehicles on side roads like many of these poor LOS intersections to enter traffic during the gaps between platoons. Since these gaps are not accounted for in the software, it incorrectly assumes that these vehicles will be severely delayed, when in fact they may not wait as long in the real world.

4.3 Conclusions

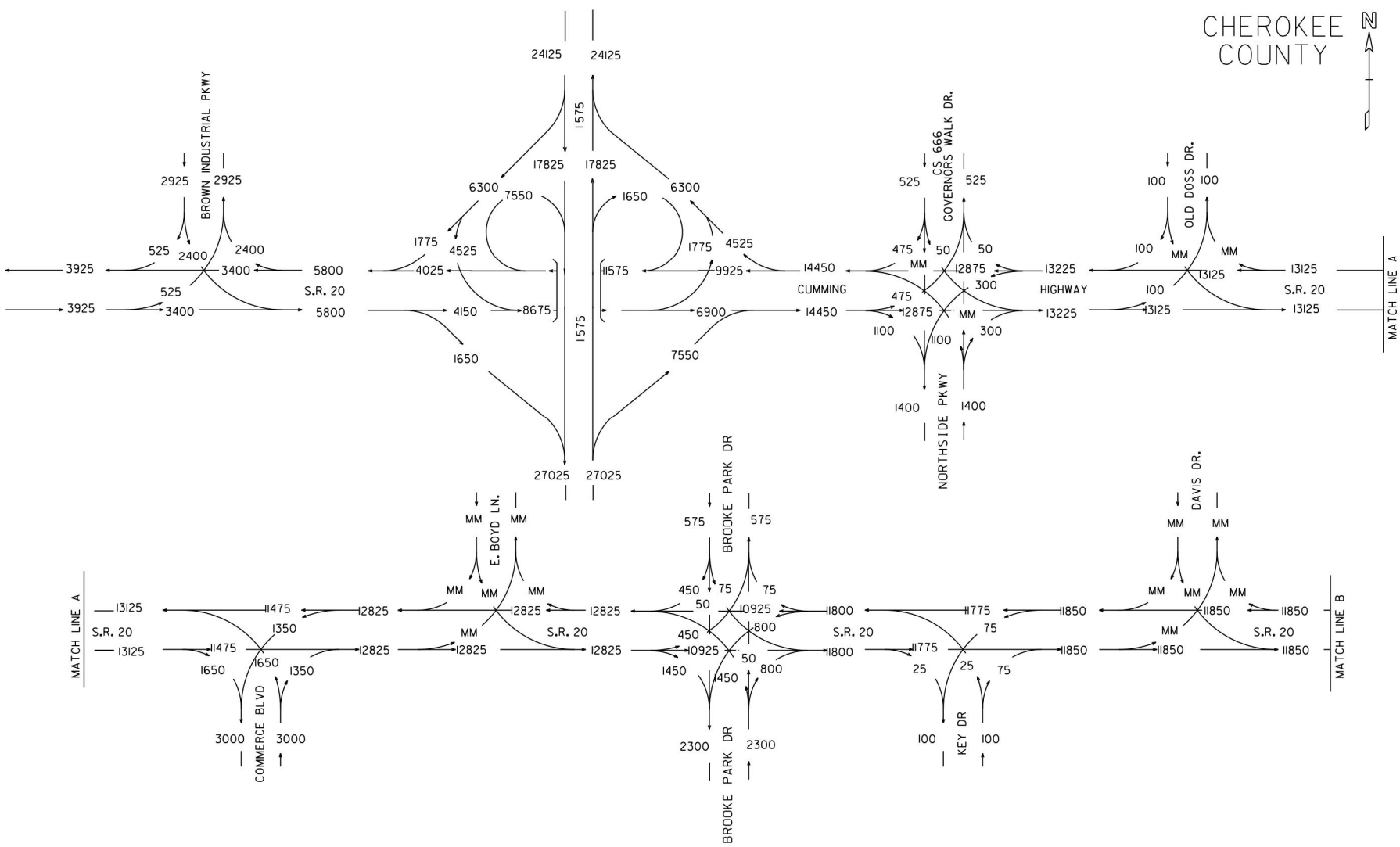
This study focused on using existing and future traffic data to determine the appropriate transportation improvement to provide a safe and efficient transportation corridor. Existing facilities and future planned projects are aligned with widening capacity on SR-20 from Scott Road to Union Hill Road. Our review of crash data for the project corridor does not prohibit widening the road; indeed there is some evidence where congestion is causing additional safety concerns. Two scenarios were considered: No-Build and Build in existing 2011, opening 2025 and design 2045 years.

GDOT approved traffic forecasting methods were used to conduct a lane call capacity analysis, which indicated that six lanes are needed on the corridor by 2025. The results of an intersection capacity analysis for the entire corridor provide further support for widening; this alternative provides the highest number of intersections providing level of service of D or better in every year and time period (AM or PM) studied. Although some intersections along the project corridor, primarily small side roads, are expected to have unacceptable level of service in the design year Build scenario, the project team finds this to be an over-estimation due to software model limitations. Finally, planning-level signal warrant analysis indicates that no additional signals are warranted along the PI 0014131 project corridor.

Attachment 5

Traffic Diagrams

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	1	6

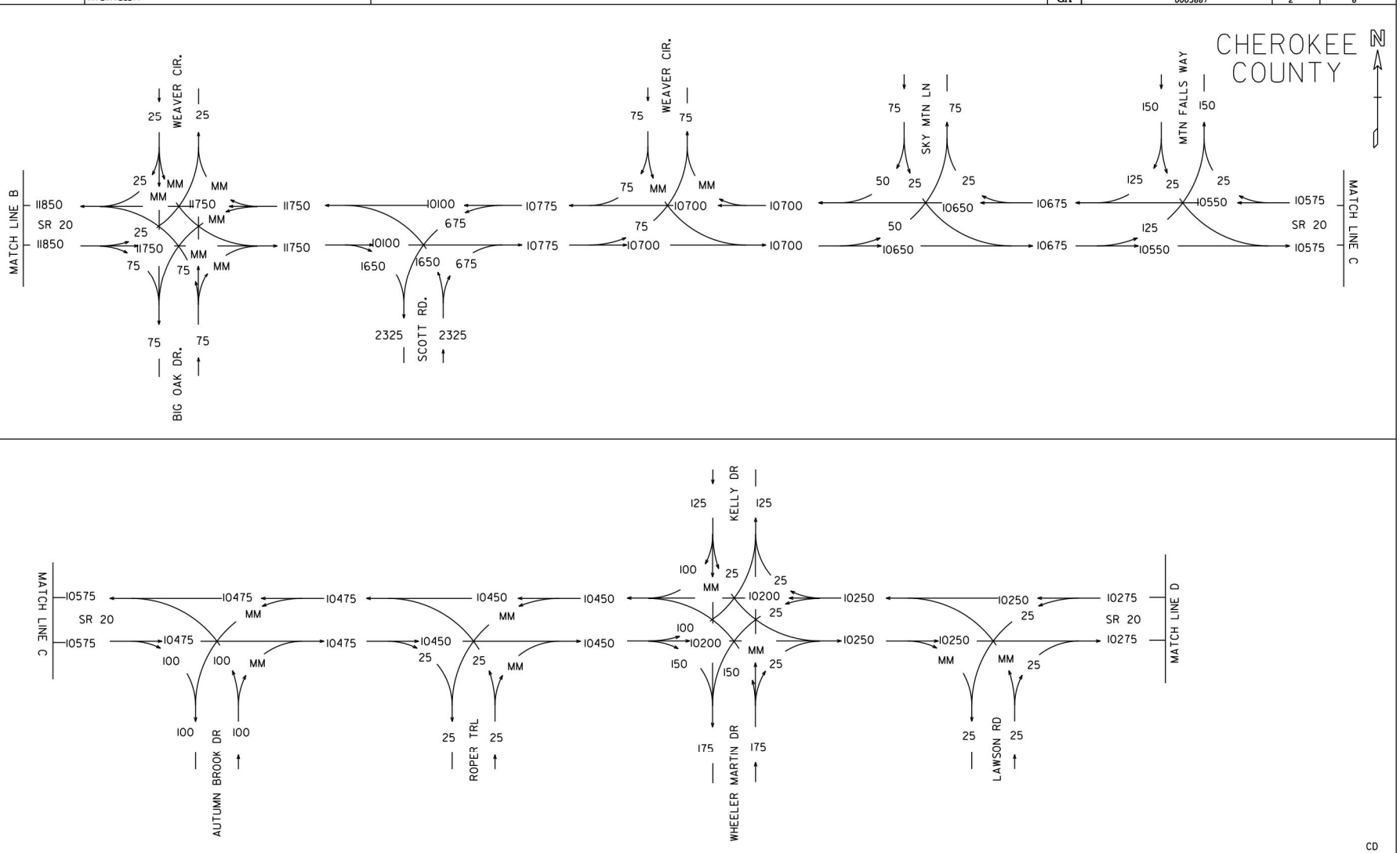


CD
5/14

STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2011 ADT	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	24 HOURS T = 16% S.U. = 10% COMB. = 6%	REVISION DATES STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-1

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 ADT

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

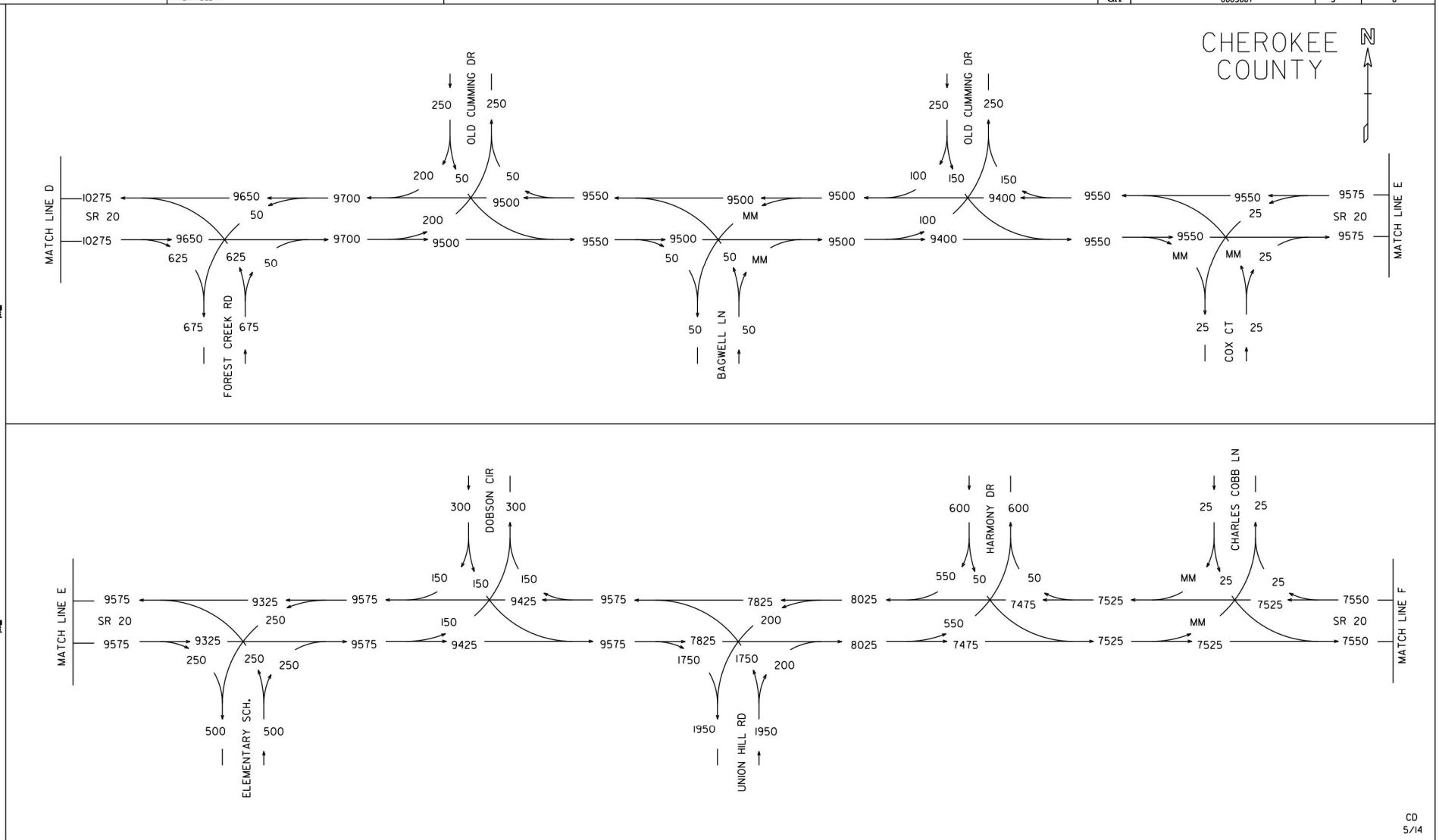
REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-2

12/14/202 GPLN

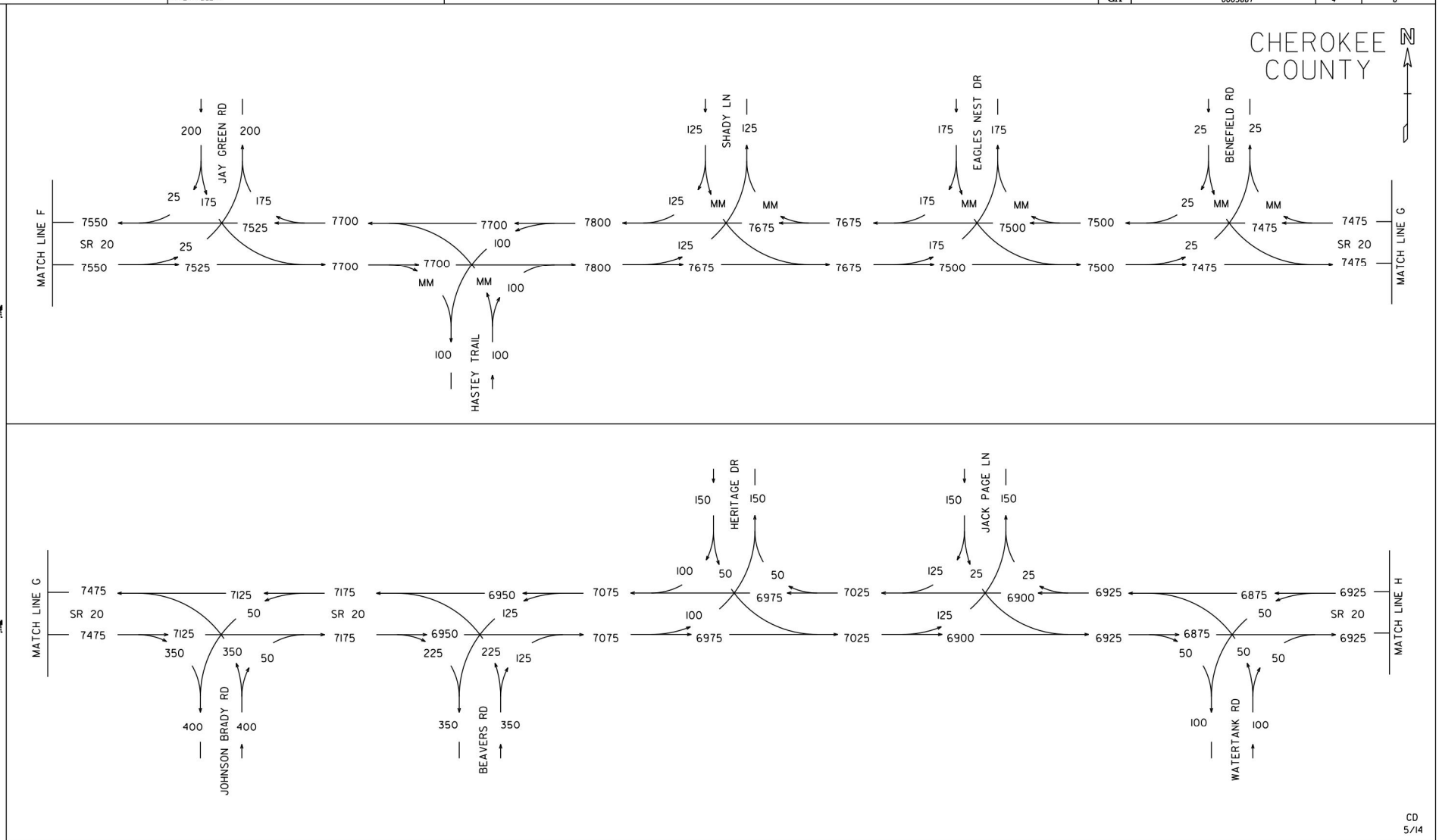
DATE$$S	TIME$$S	PRFS	DGNS	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$S		GA	0003681	3	6



STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2011 ADT	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	24 HOURS T = 16% S.U. = 10% COMB. = 6%	REVISION DATES	STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-3

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2011 ADT

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

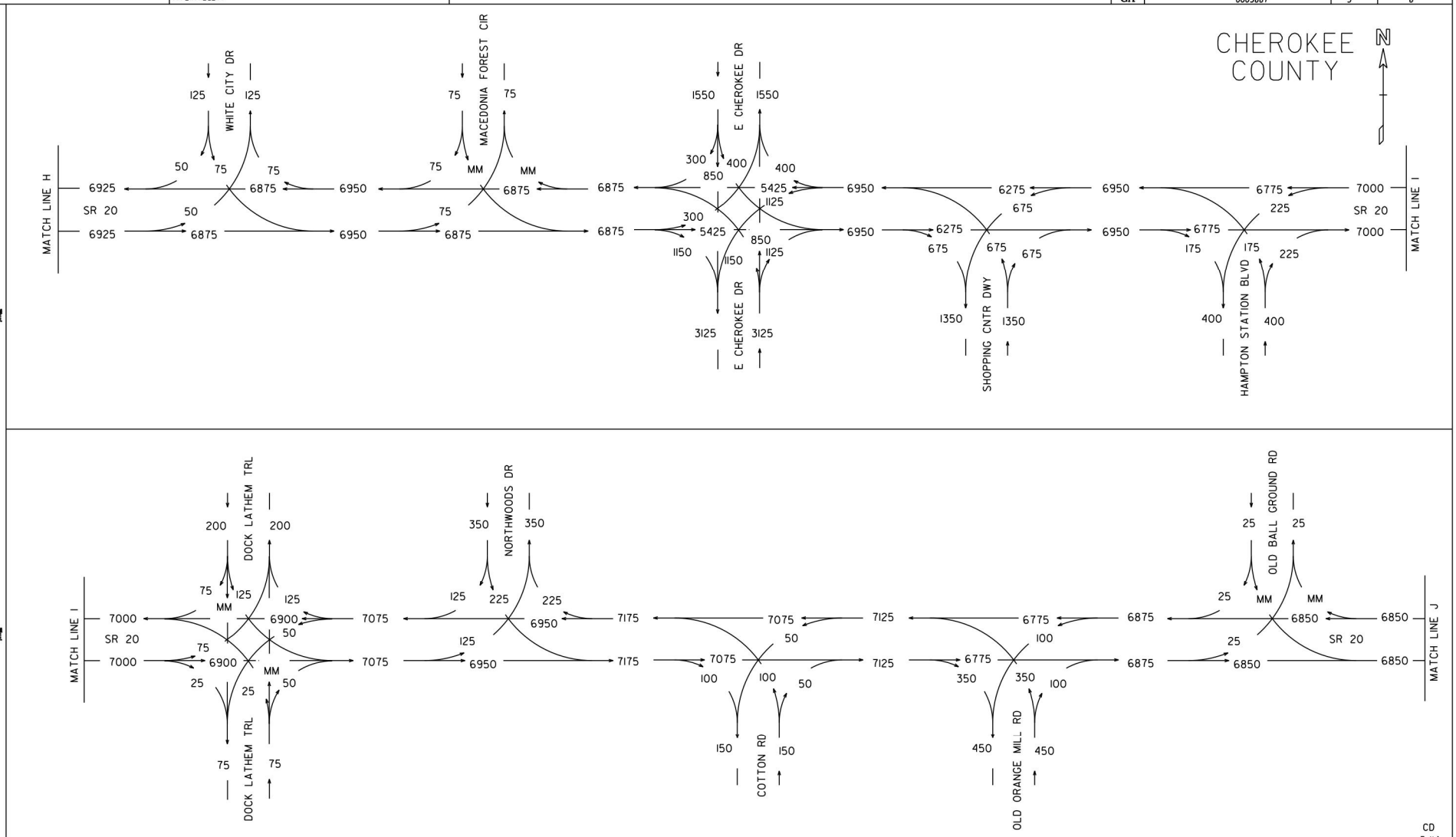
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-4

12/14/2012 GPLH

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	5	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2011 ADT

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

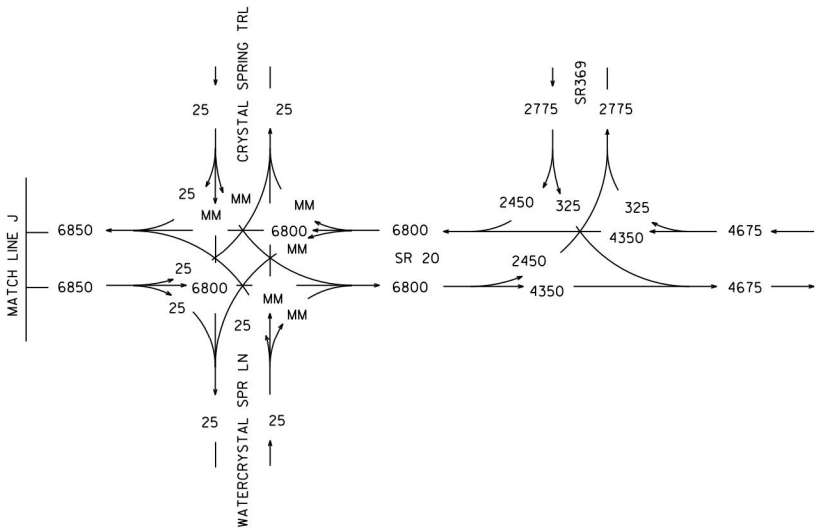
REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-5

12/14/2012 GPLN

DATE$$	TIME$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	6	6



CHEROKEE COUNTY

N

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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2011 ADT

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

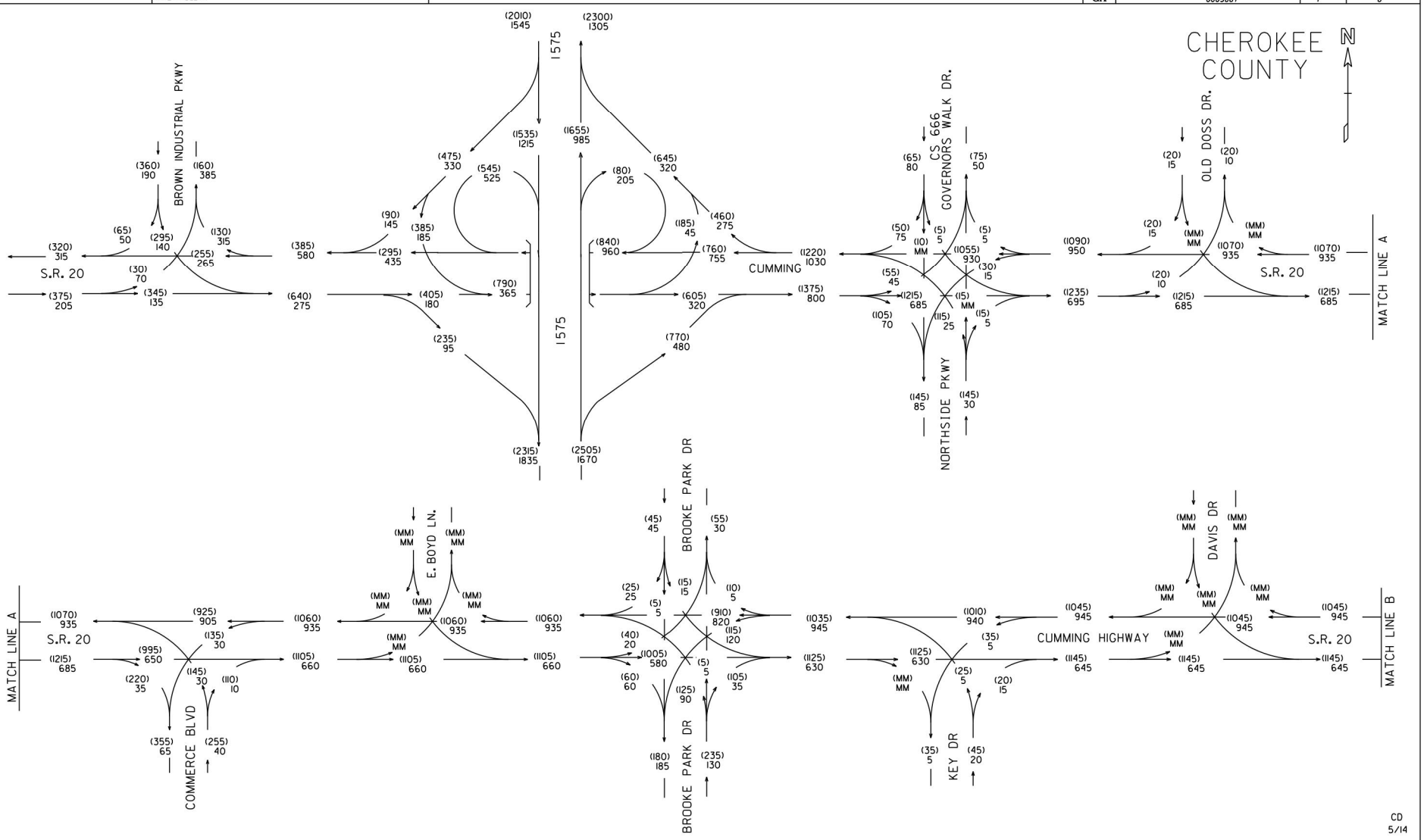
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-6

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	1	6



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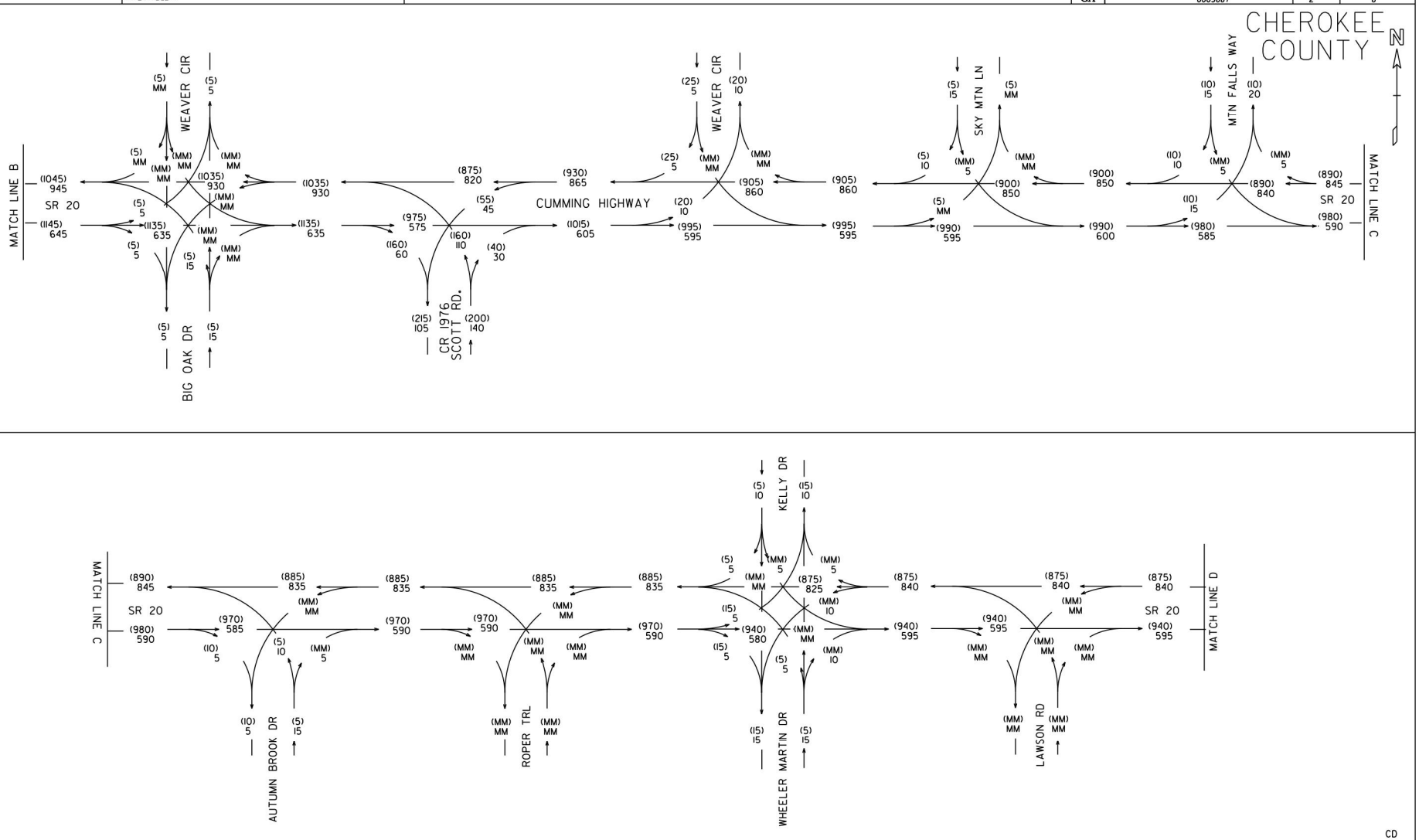
5/14

STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2011 PM DHV = (000) 2011 AM DHV = 000	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	T = 12.5% S.U. = 7.5% COMB. = 5%	REVISION DATES STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-7

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

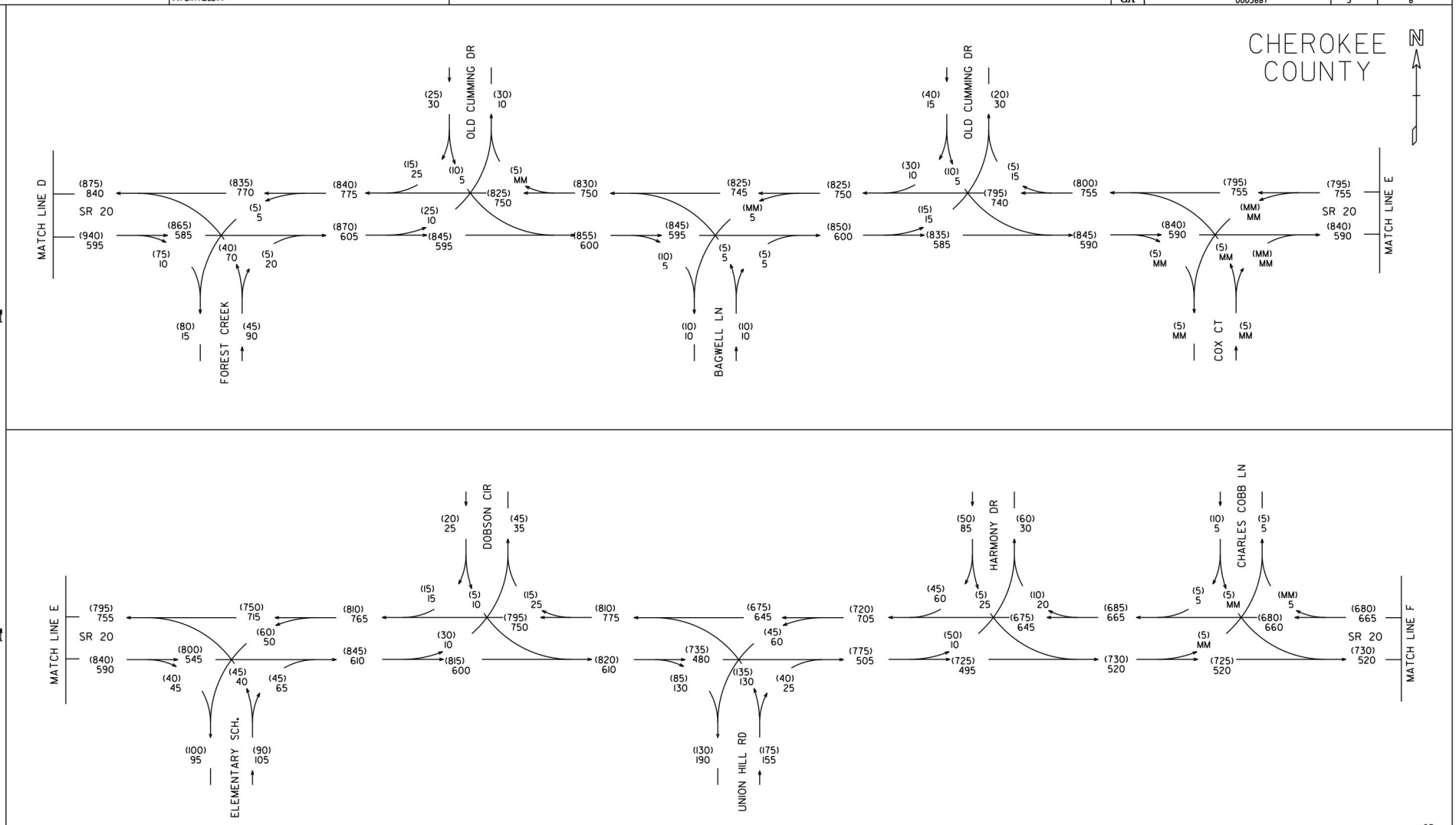
REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-8

12/14/2012 GPL#

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	3	6



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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

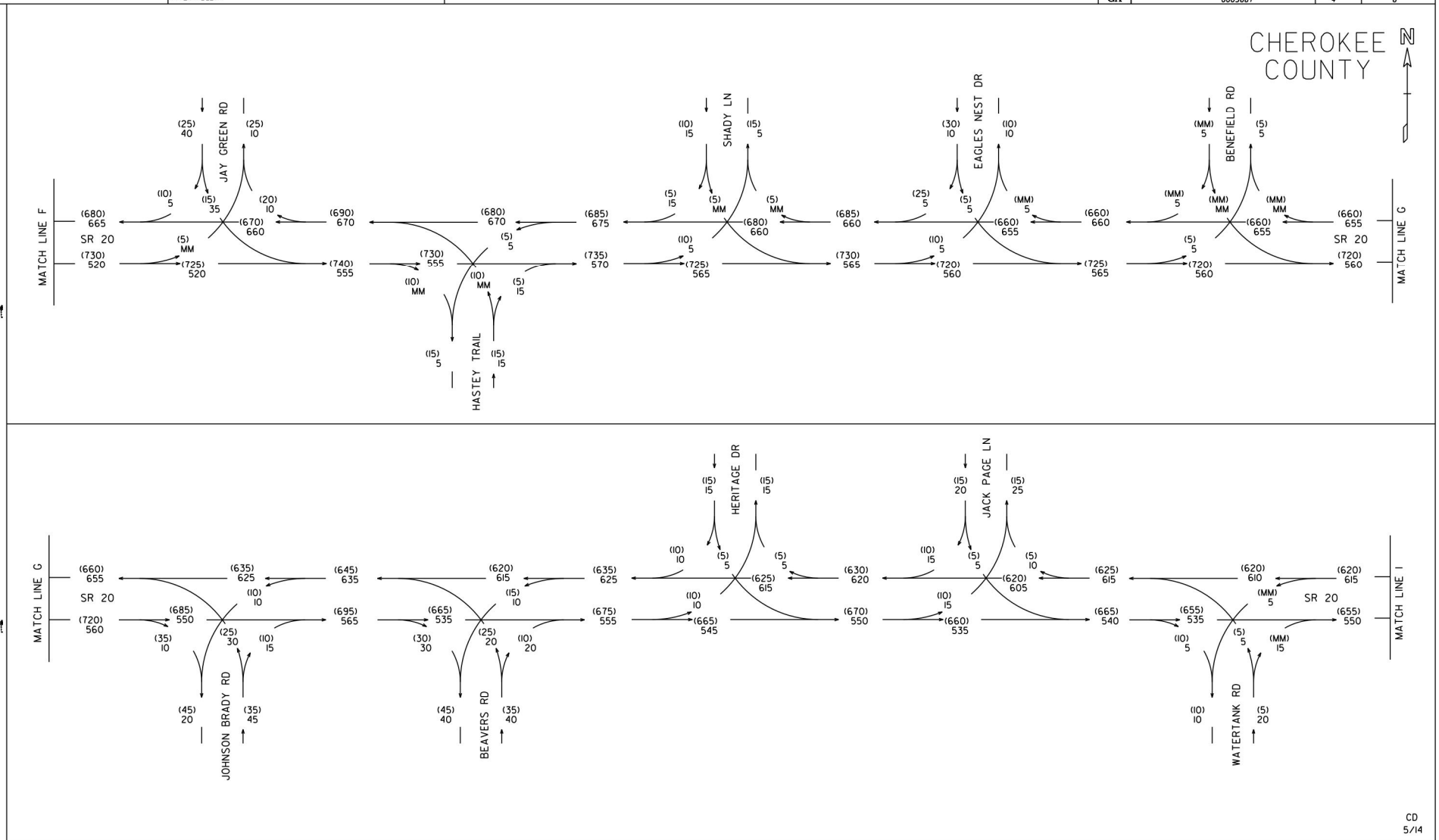
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-9

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

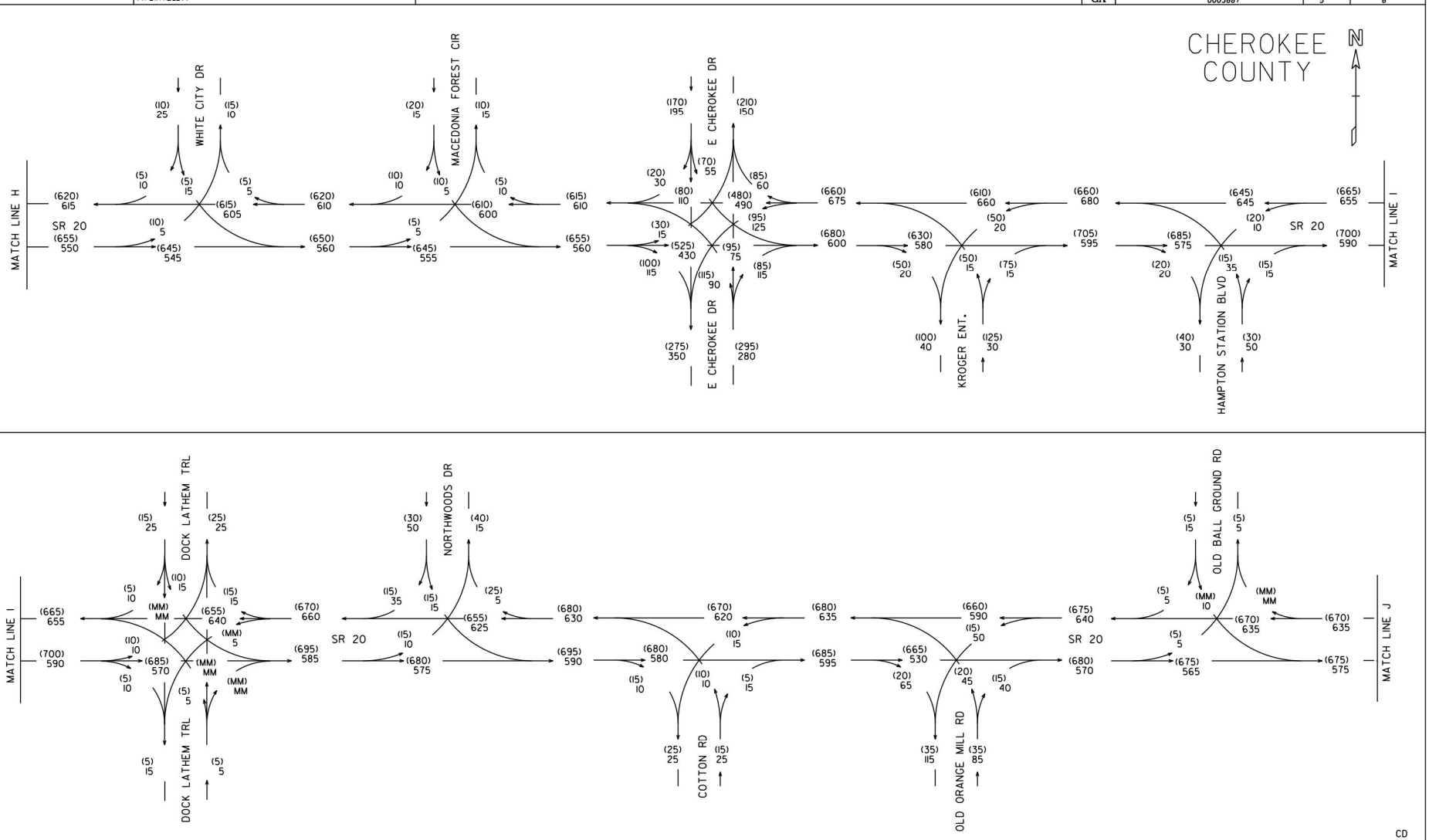
REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-10

12/14/2012 GPLR

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	5	6



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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

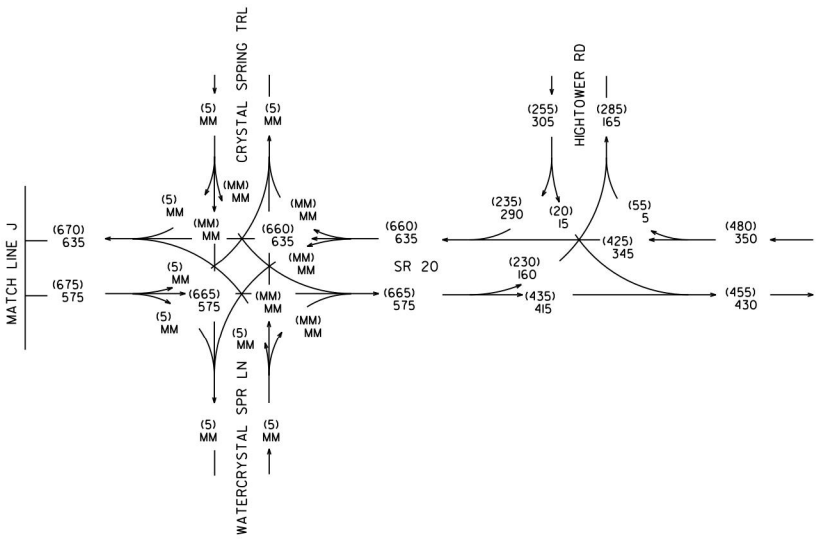
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-11

12/14/202 GPLN

DATE$$ $USER$	TIME$$	$PRFB$ $$PENTABLE$$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
				GA	0003681	6	6



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

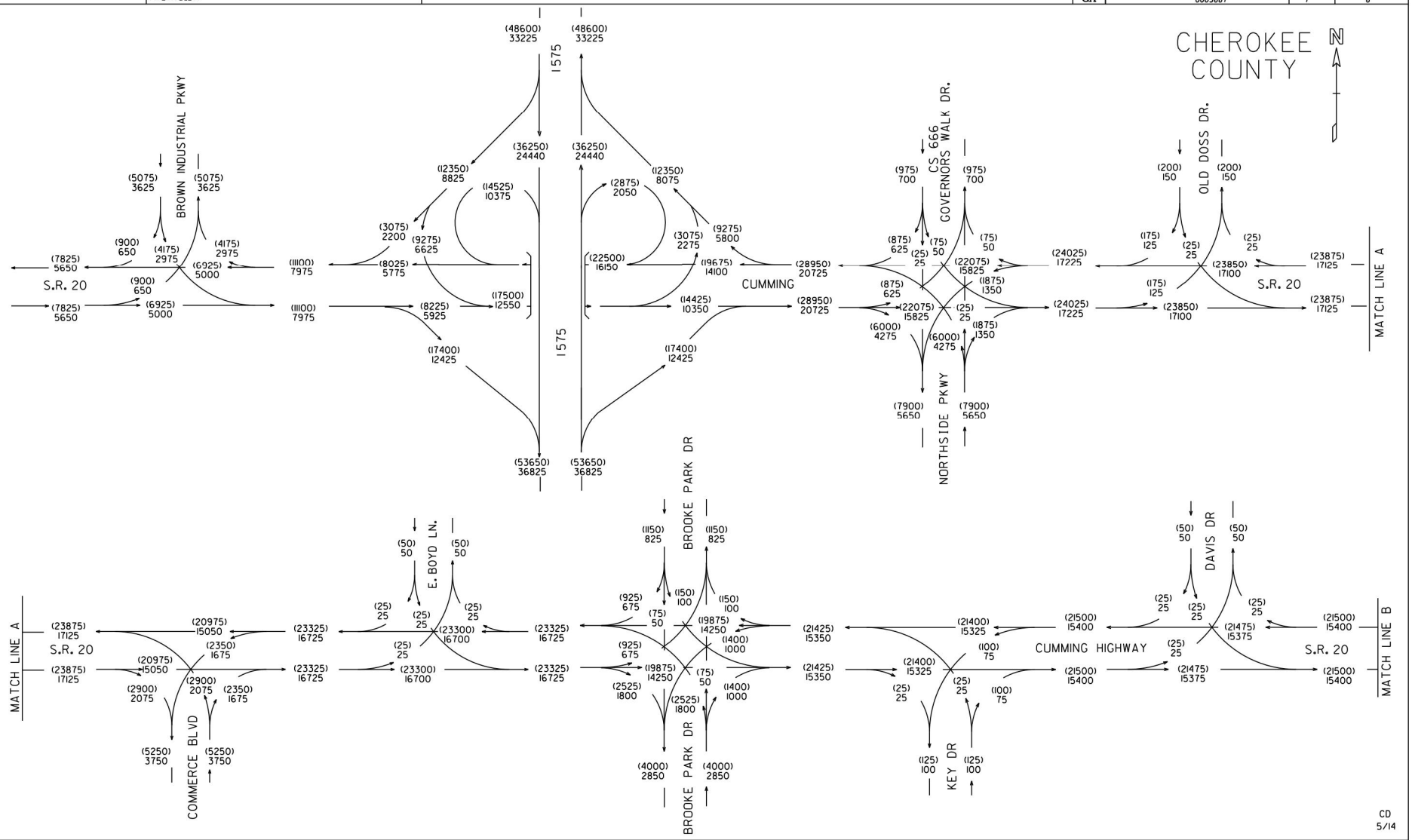
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-12

12/14/2012 GPLN

DATE=$	TIME=$	$PRFB$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	1	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

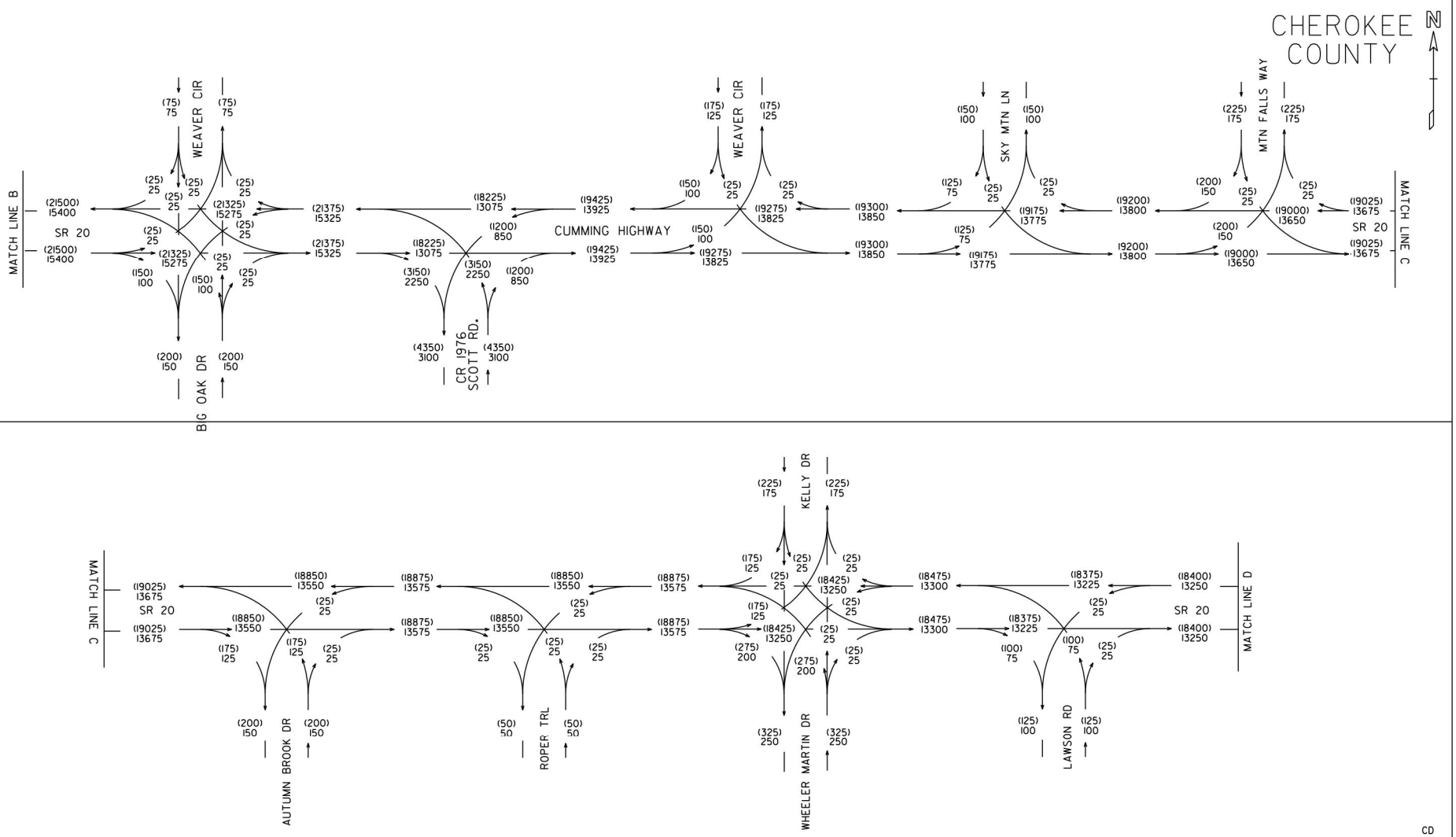
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-13

12/14/2012 GPLN

DATE$$	TIME$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

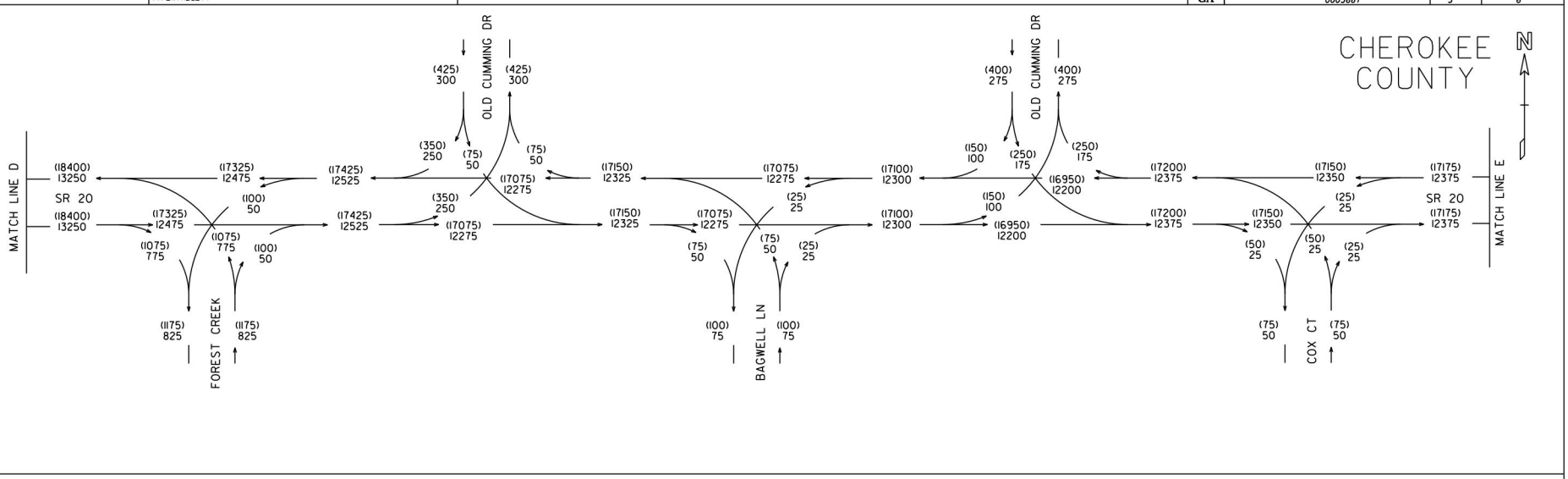
REVISION DATES

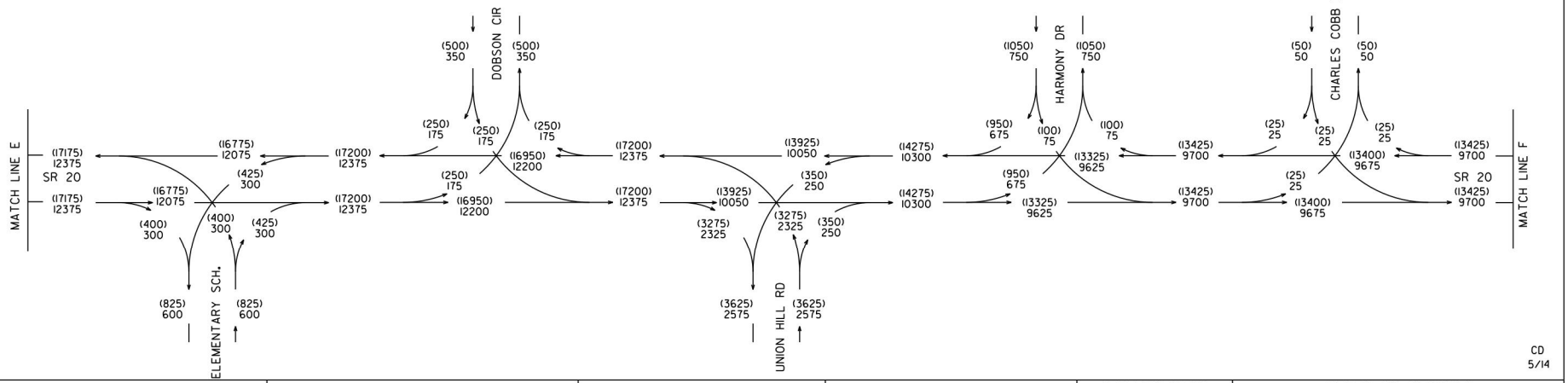
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-14

12/14/2012 GPLH

DATE$$$	TIME$$$	$PRF$$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	3	6





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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

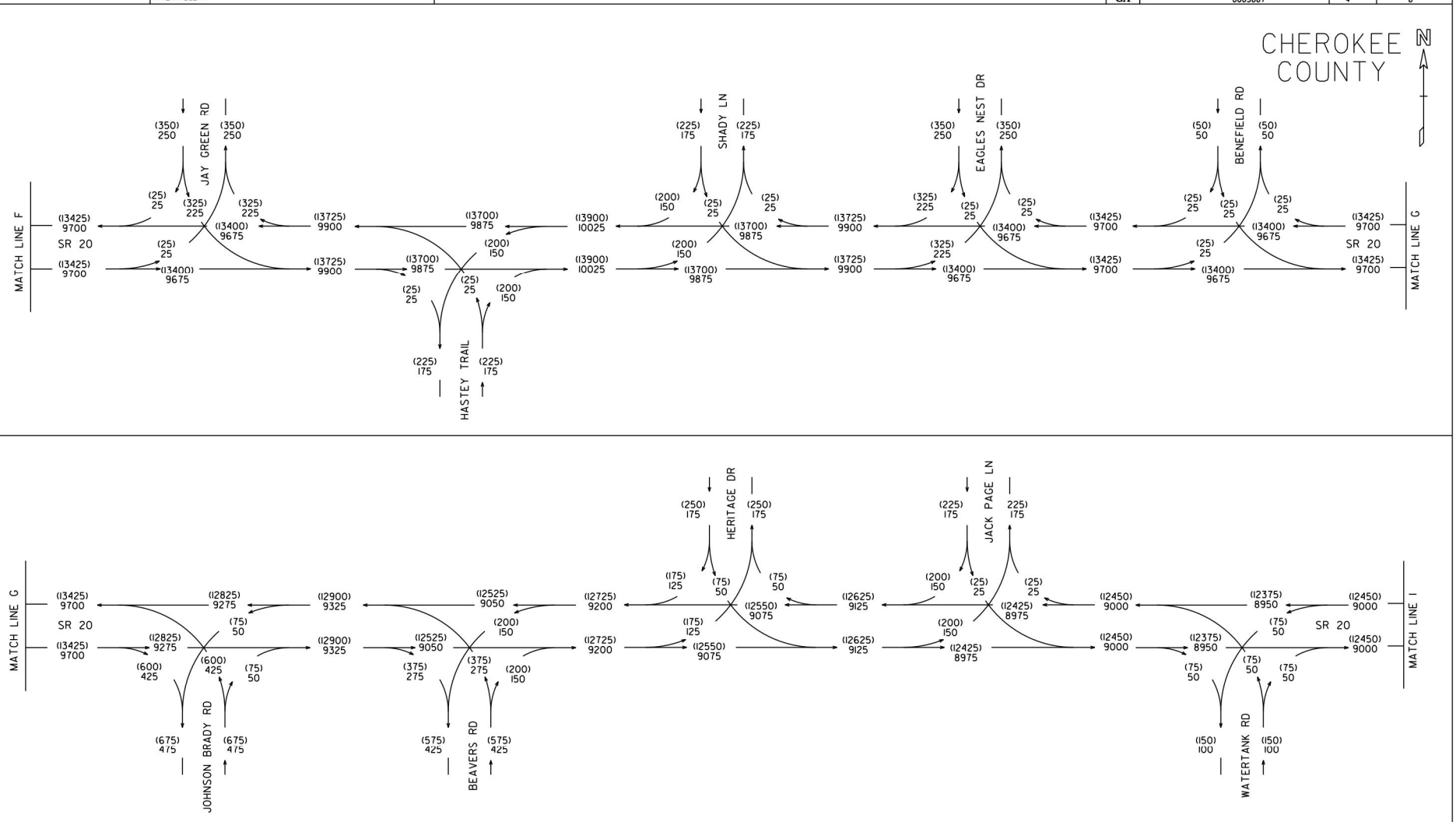
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-15

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF$$	#DGN#	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

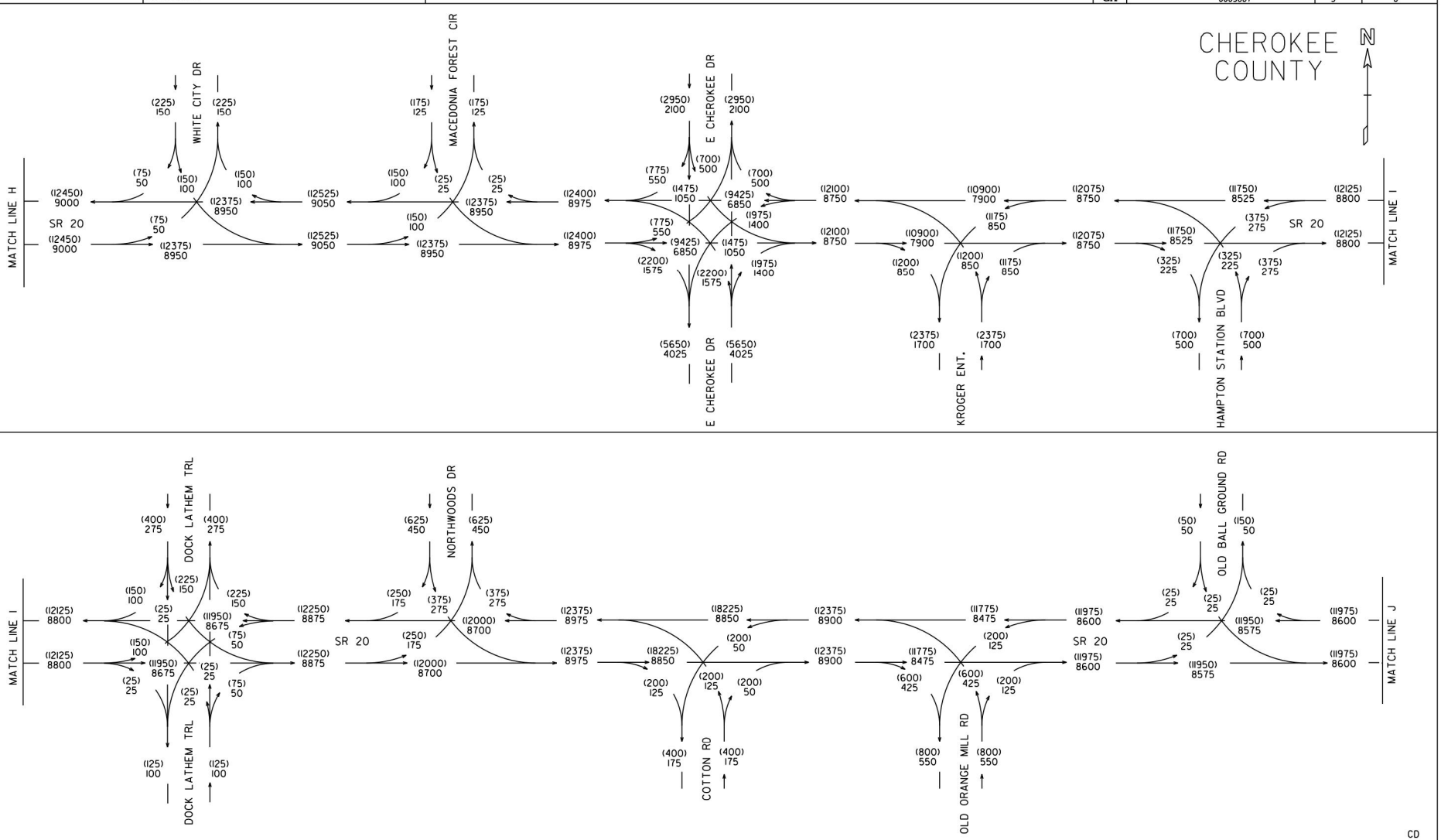
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-16

12/14/2012 GPLN

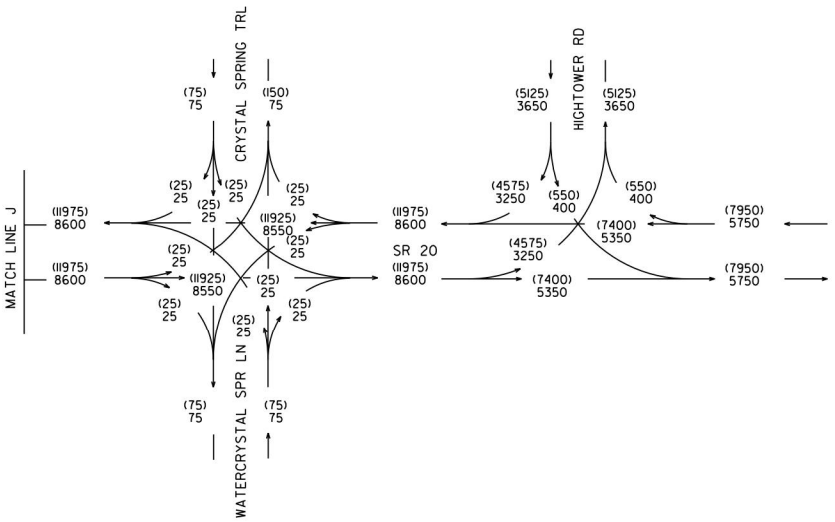
DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	5	6



STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2045 NO BUILD ADT = (000) 2025 NO BUILD ADT = 000	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	24 HOURS T = 16% S.U. = 10% COMB. = 6%	REVISION DATES STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-17

12/14/2012 GPLN

DATE$$$ $USER$	TIME$$$	$PRF8$ $$PENTABLE$$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
				GA	0003681	6	6



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

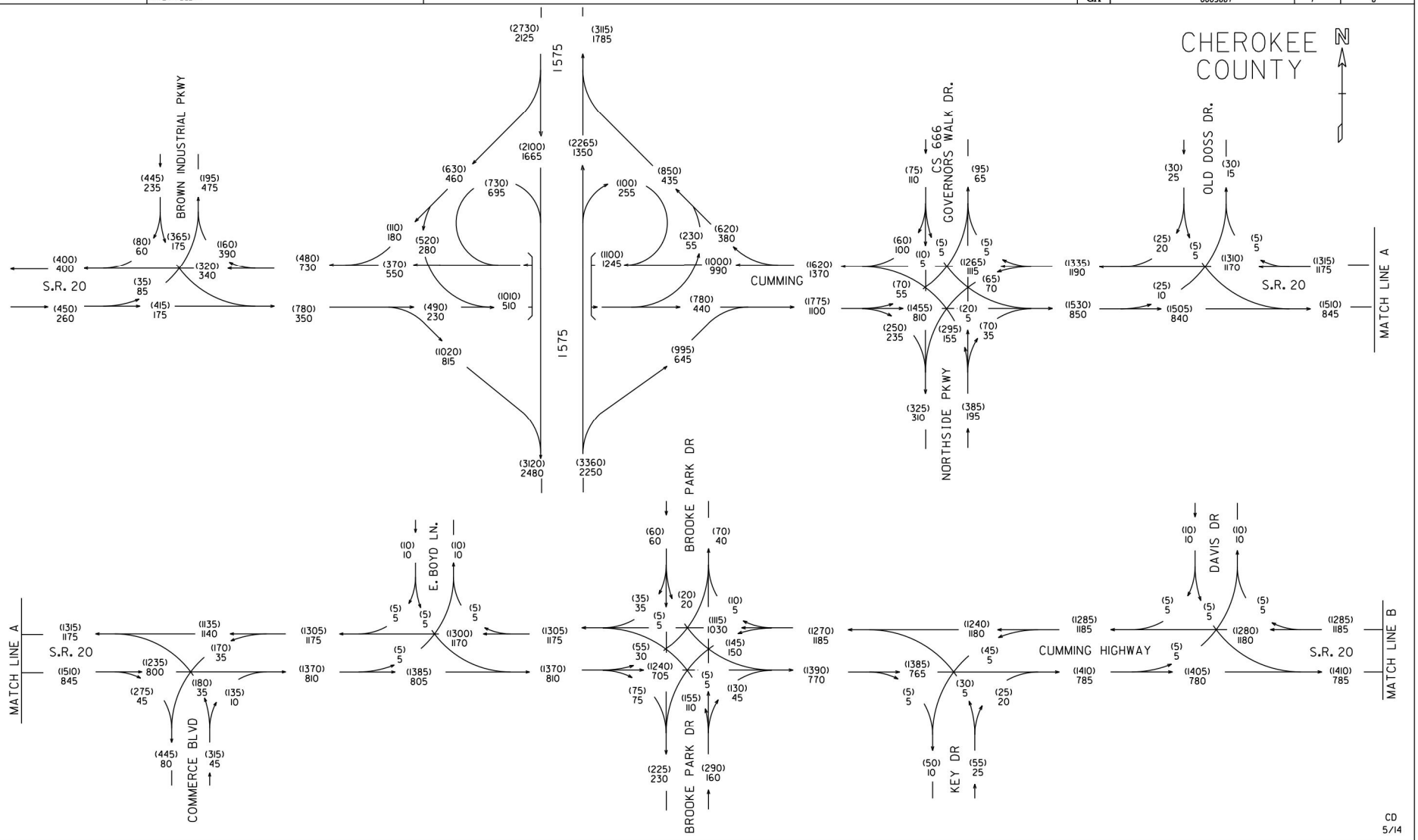
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-18

12/14/2012 GPLN

DATE###	TIME###	#PRF8#	#DGN#	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
#USER#		##PENTABLE##		GA	0003681	1	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

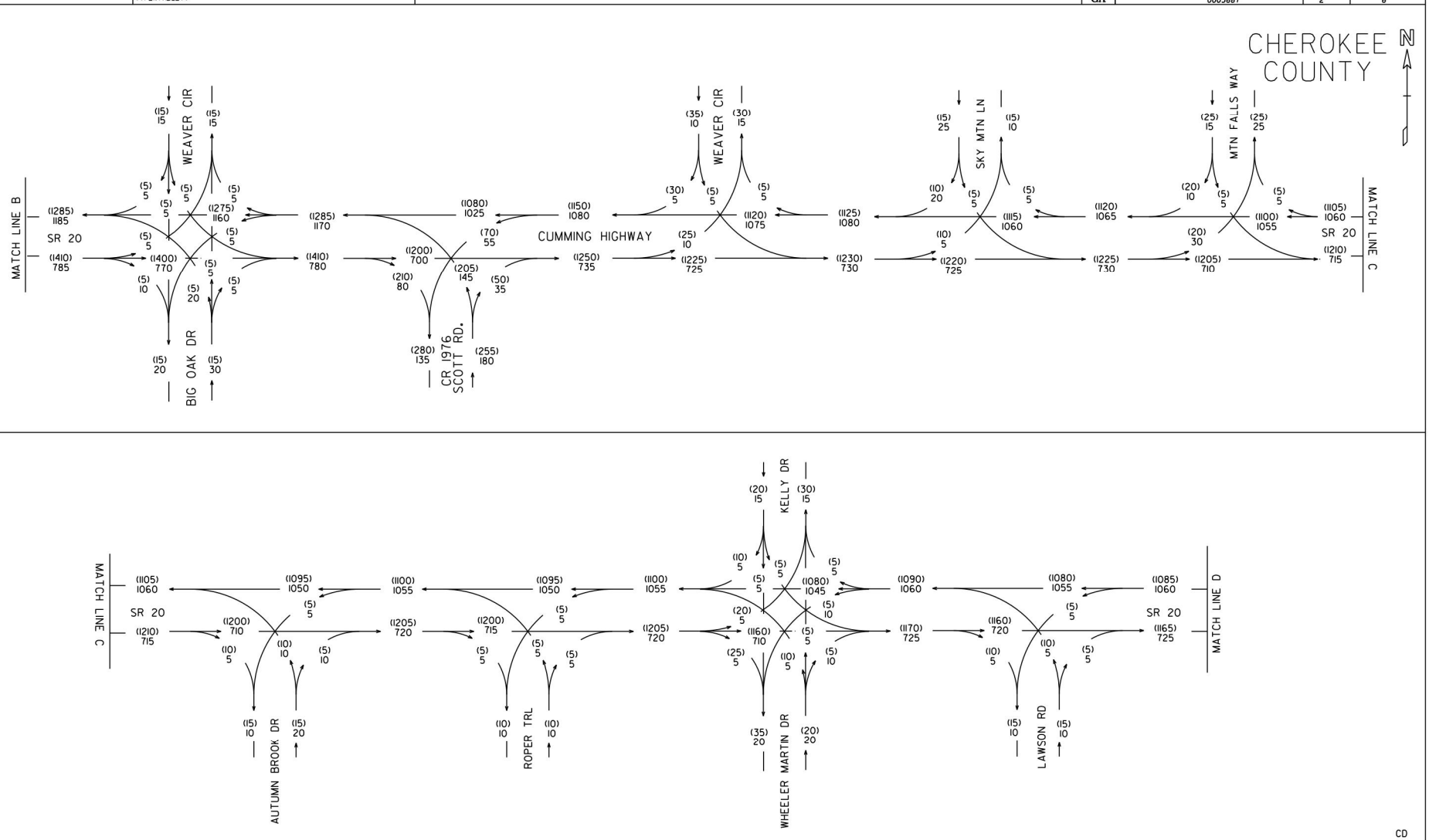
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-19

12/14/202 GPLN

DATE$$	TIME$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

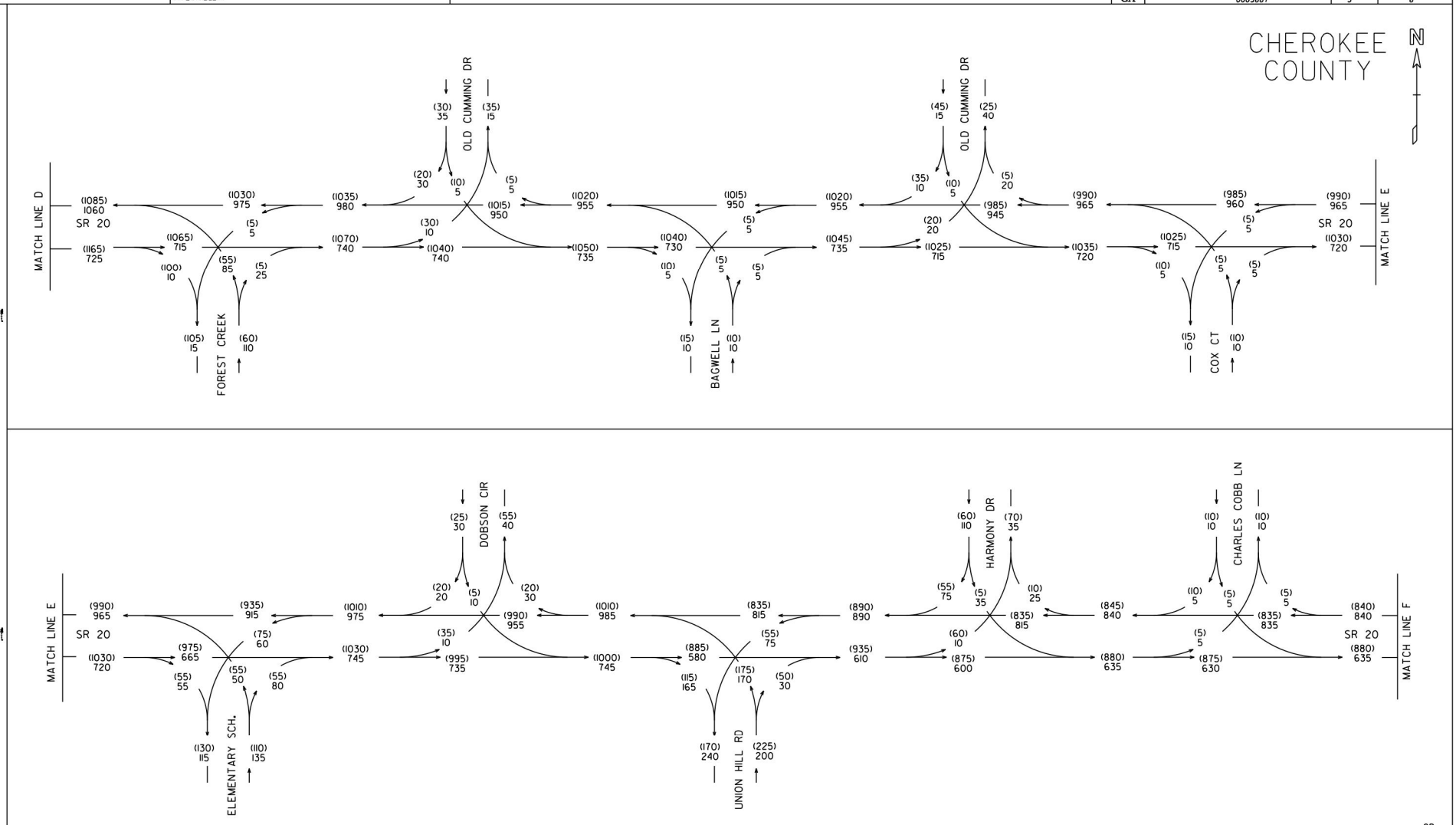
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-20

12/14/2012 GPLN

DATE=$$	TIME=$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	3	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

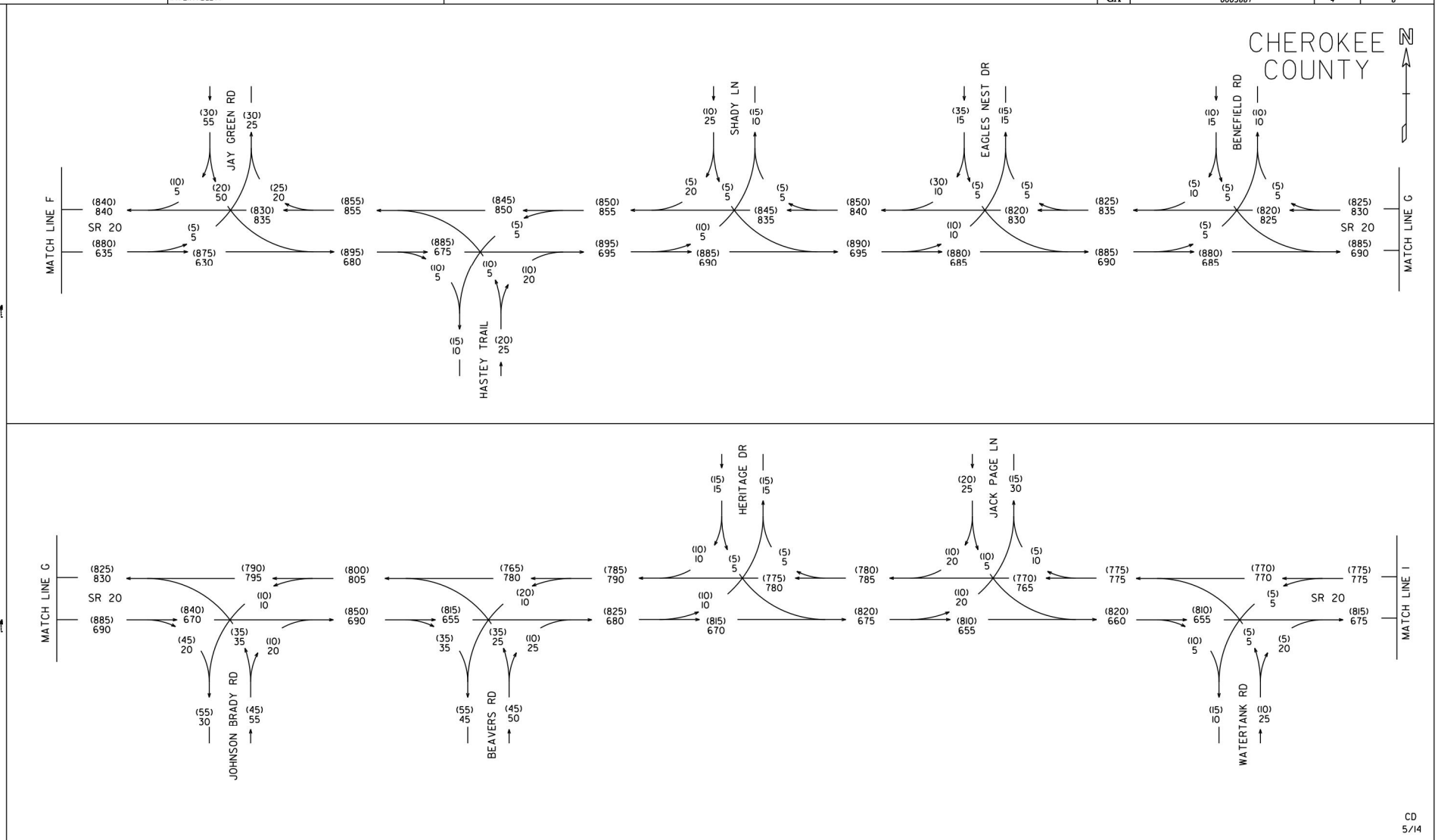
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-21

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

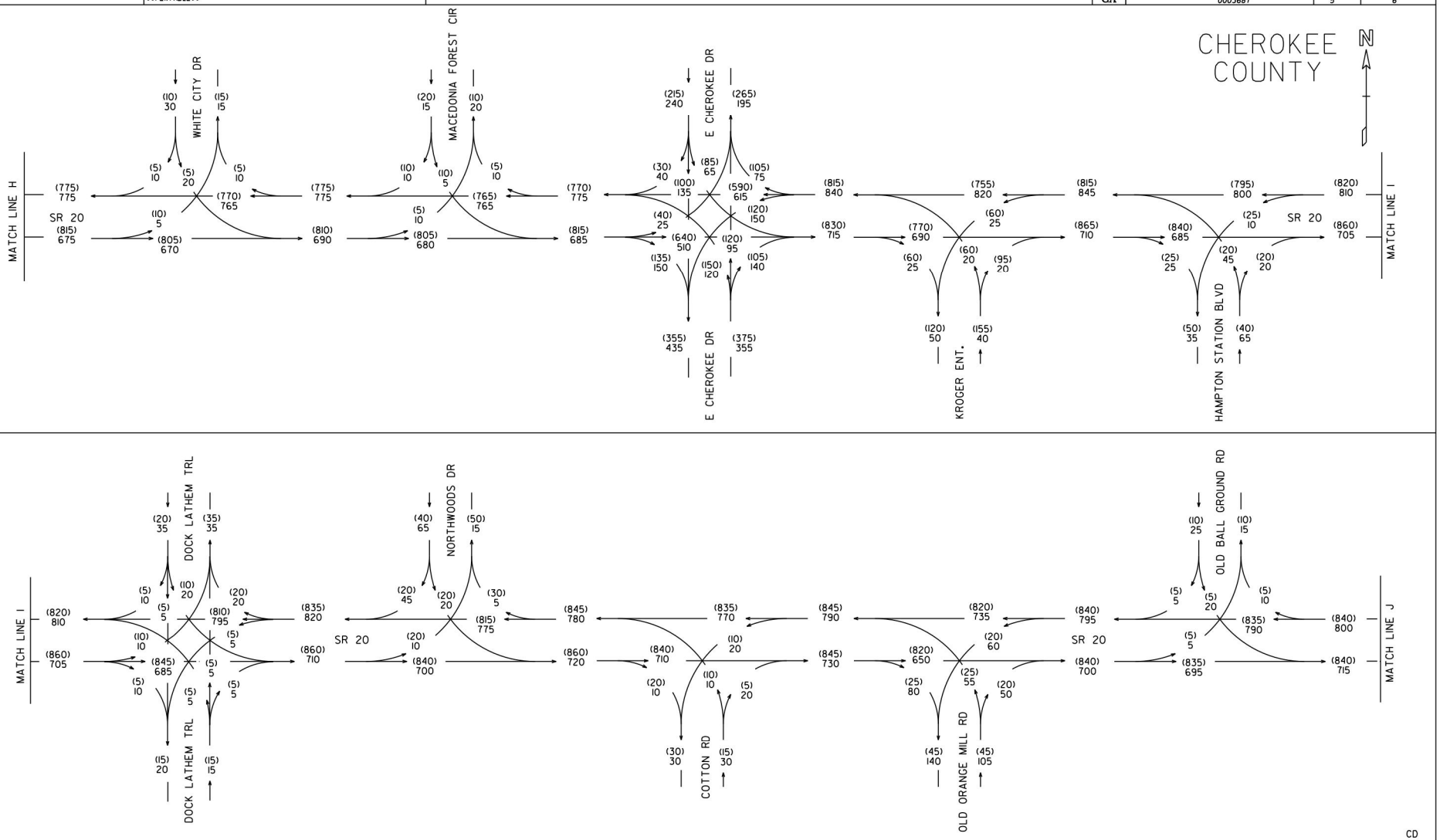
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-22

12/14/2012 GPLN

DATE$$$	TIME$$$	PRF	#DGN#	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	5	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

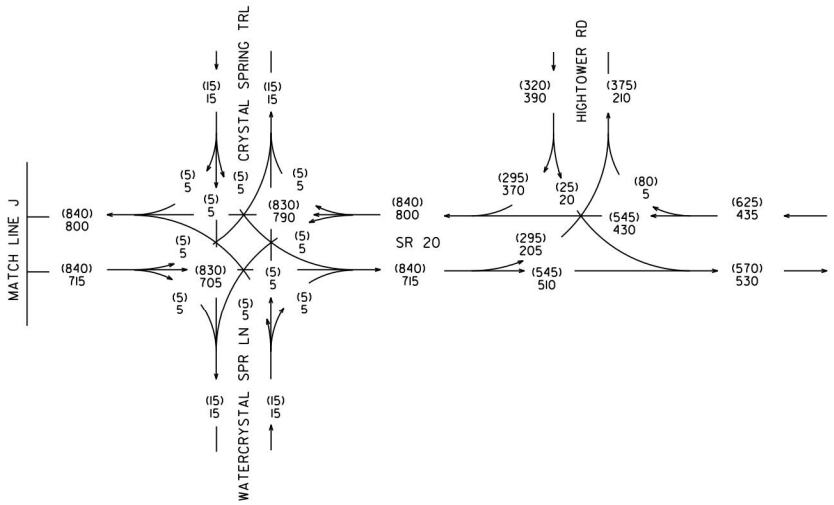
DRAWING No.
10-23

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	6	6

CHEROKEE COUNTY

N



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

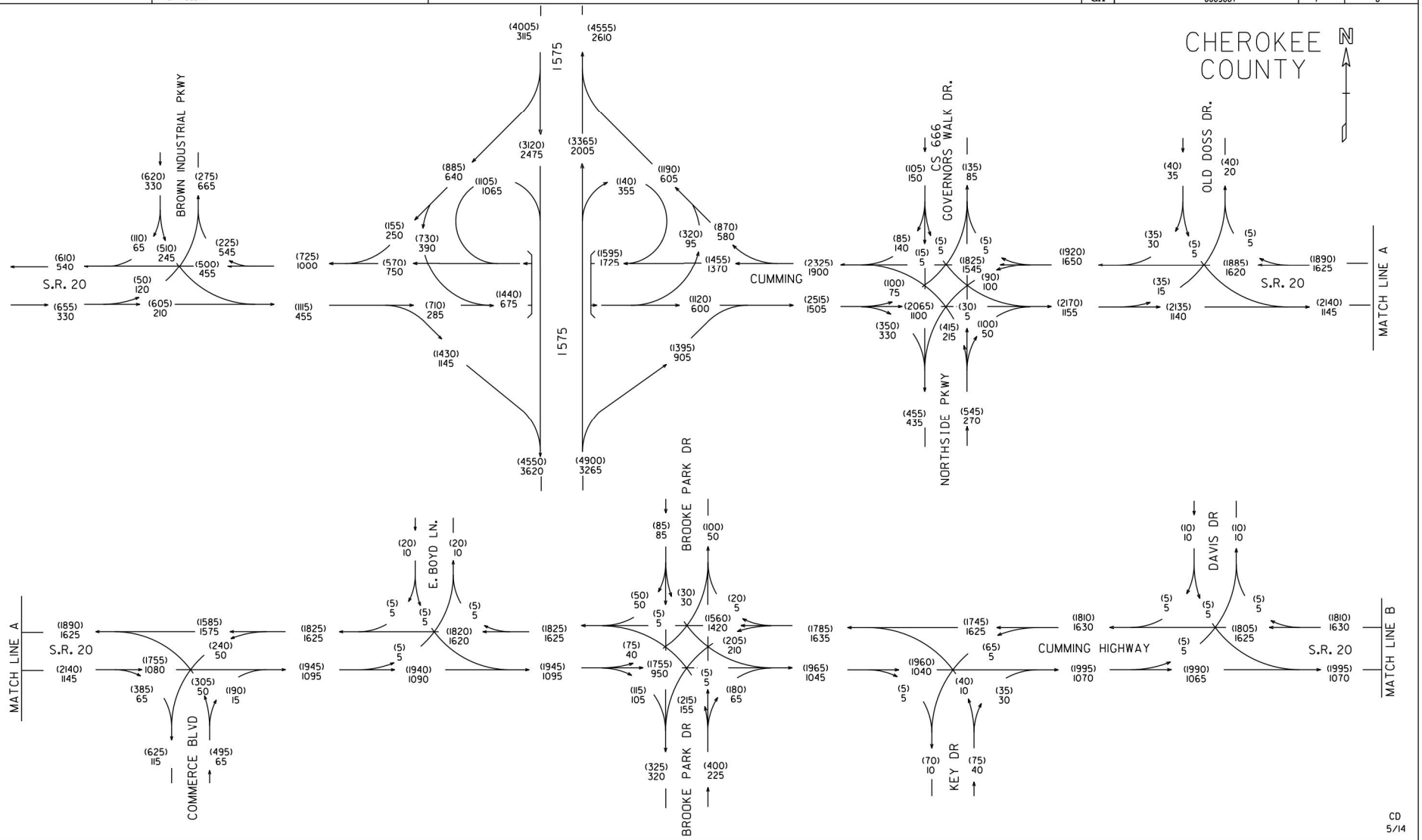
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-24

12/14/2012 GPLN

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	1	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

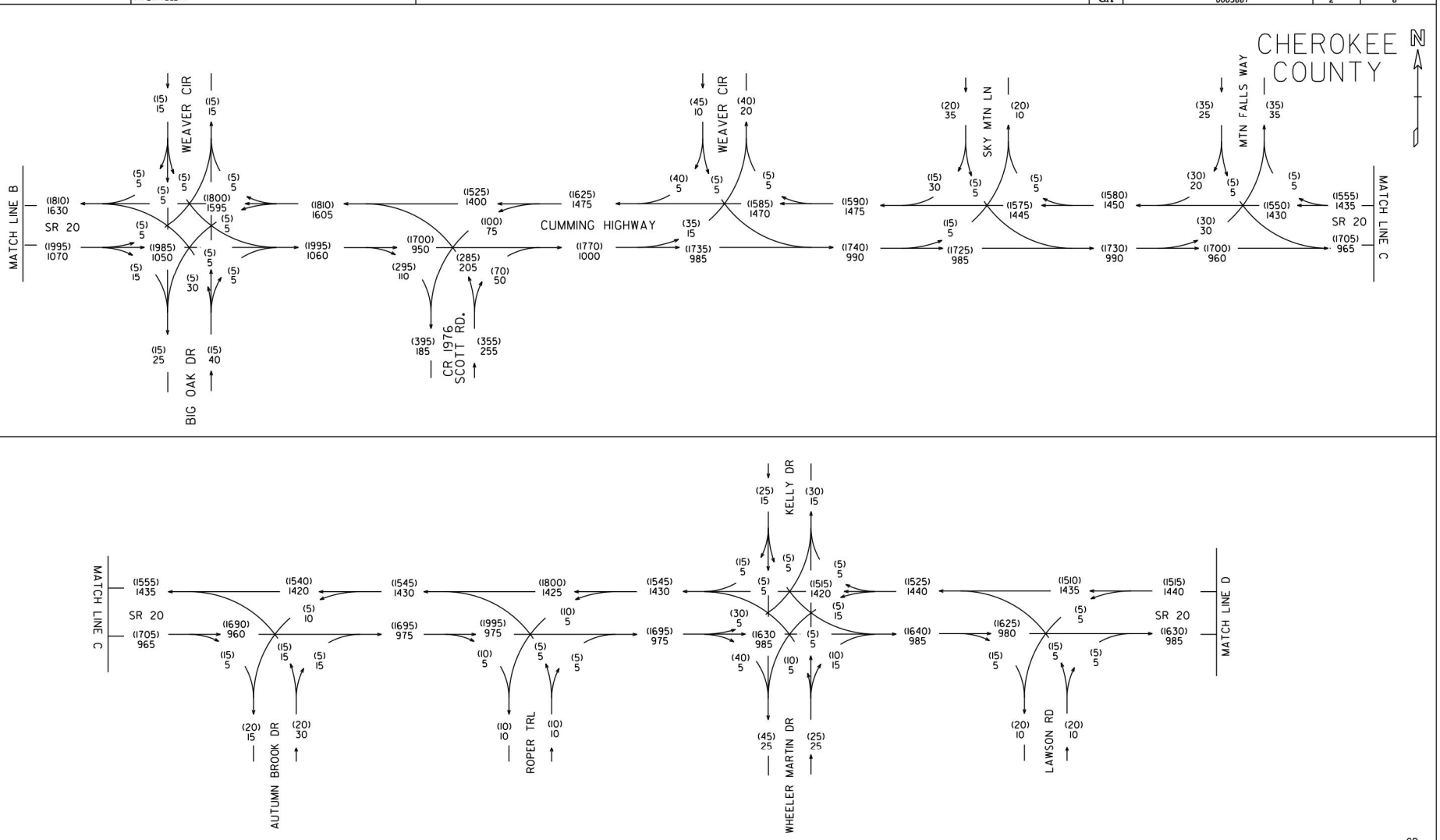
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-25

12/14/202 GPLN

DATE$$	TIME$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

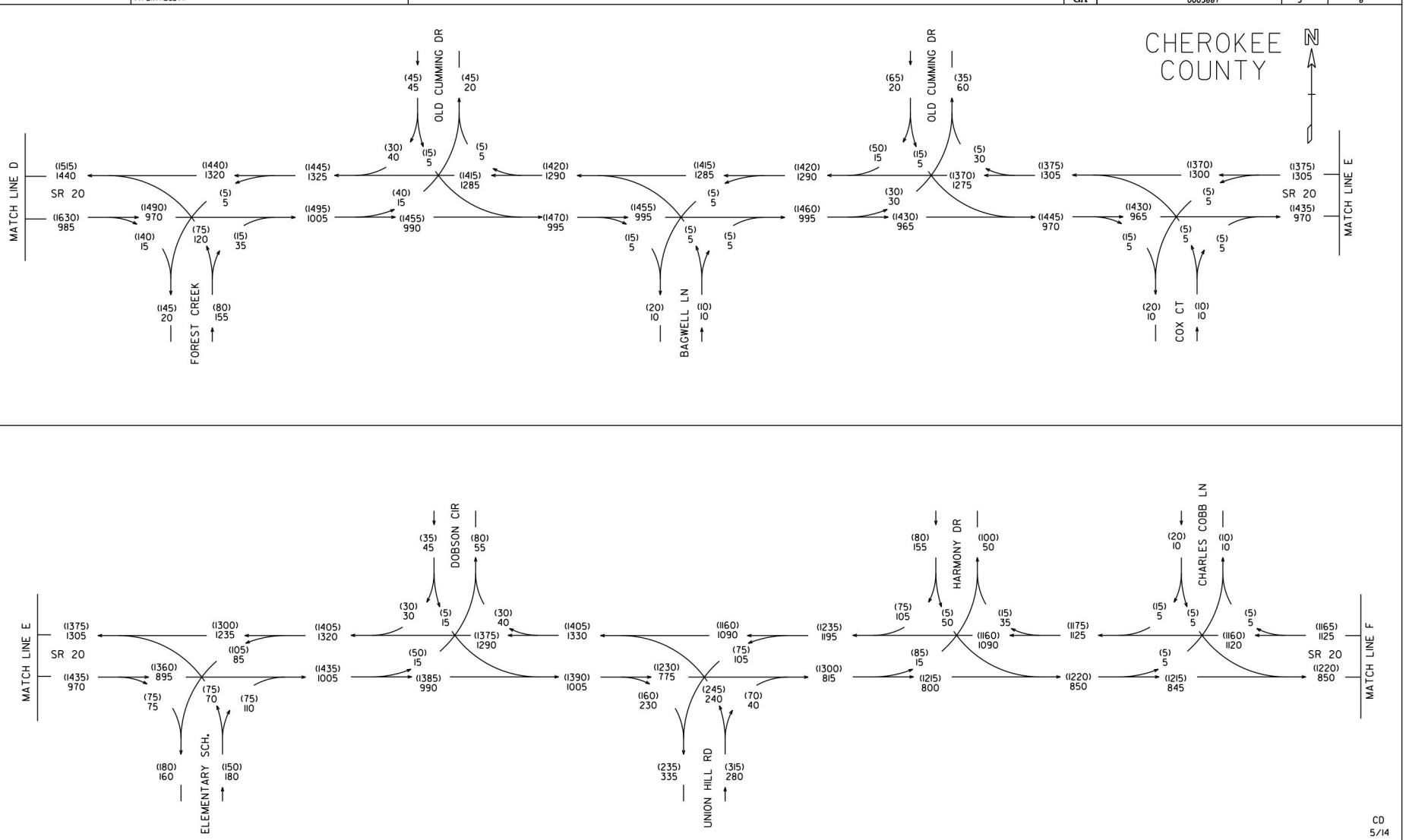
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-26

12/14/2012 GPLN

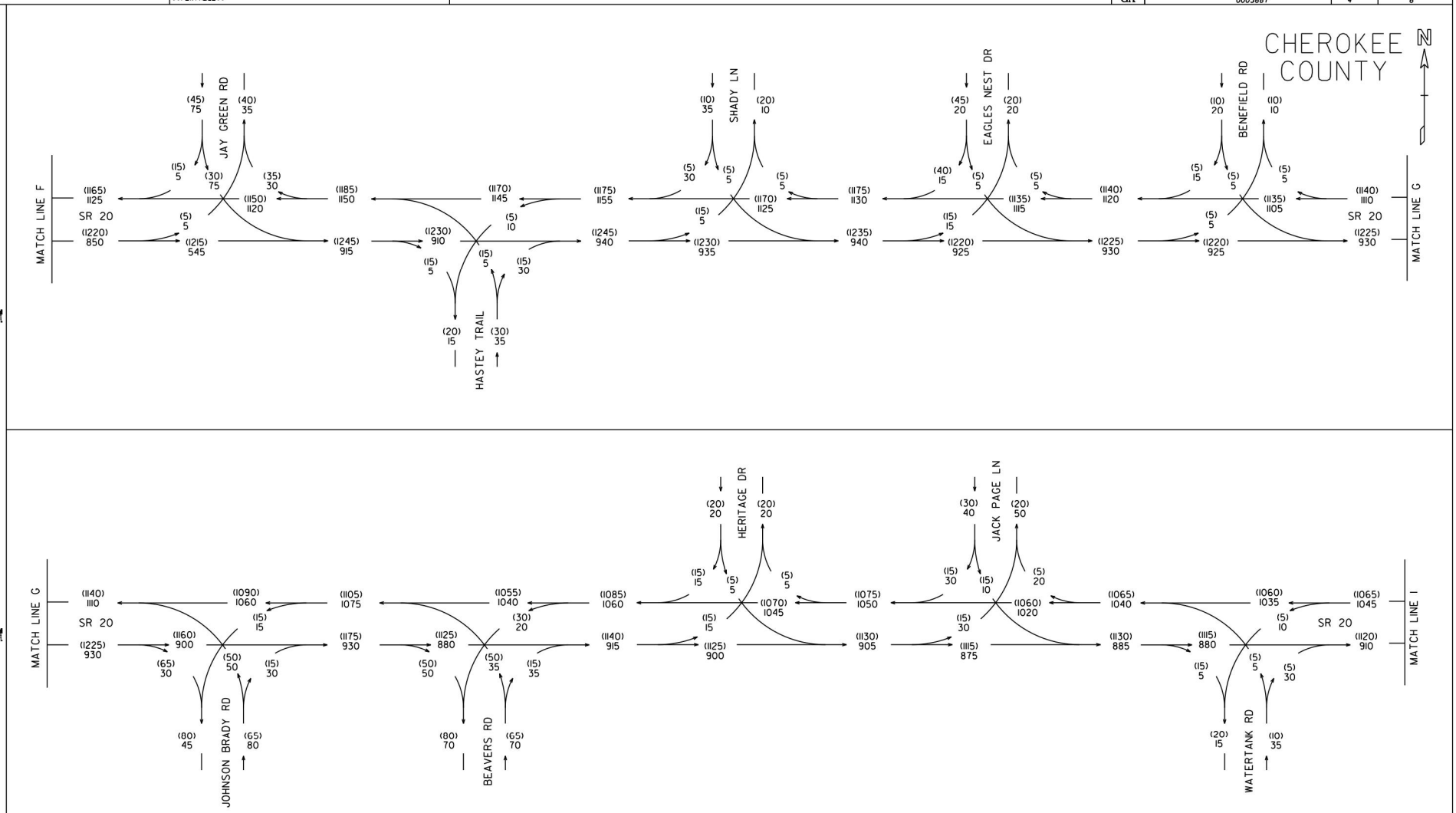
DATE$$	TIME$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	3	6



STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2045 NO BUILD PM DHV = (000) 2045 NO BUILD AM DHV = 000	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	T = 12.5% S.U. = 7.5% COMB. = 5%	REVISION DATES STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-27

12/14/202 GPL

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

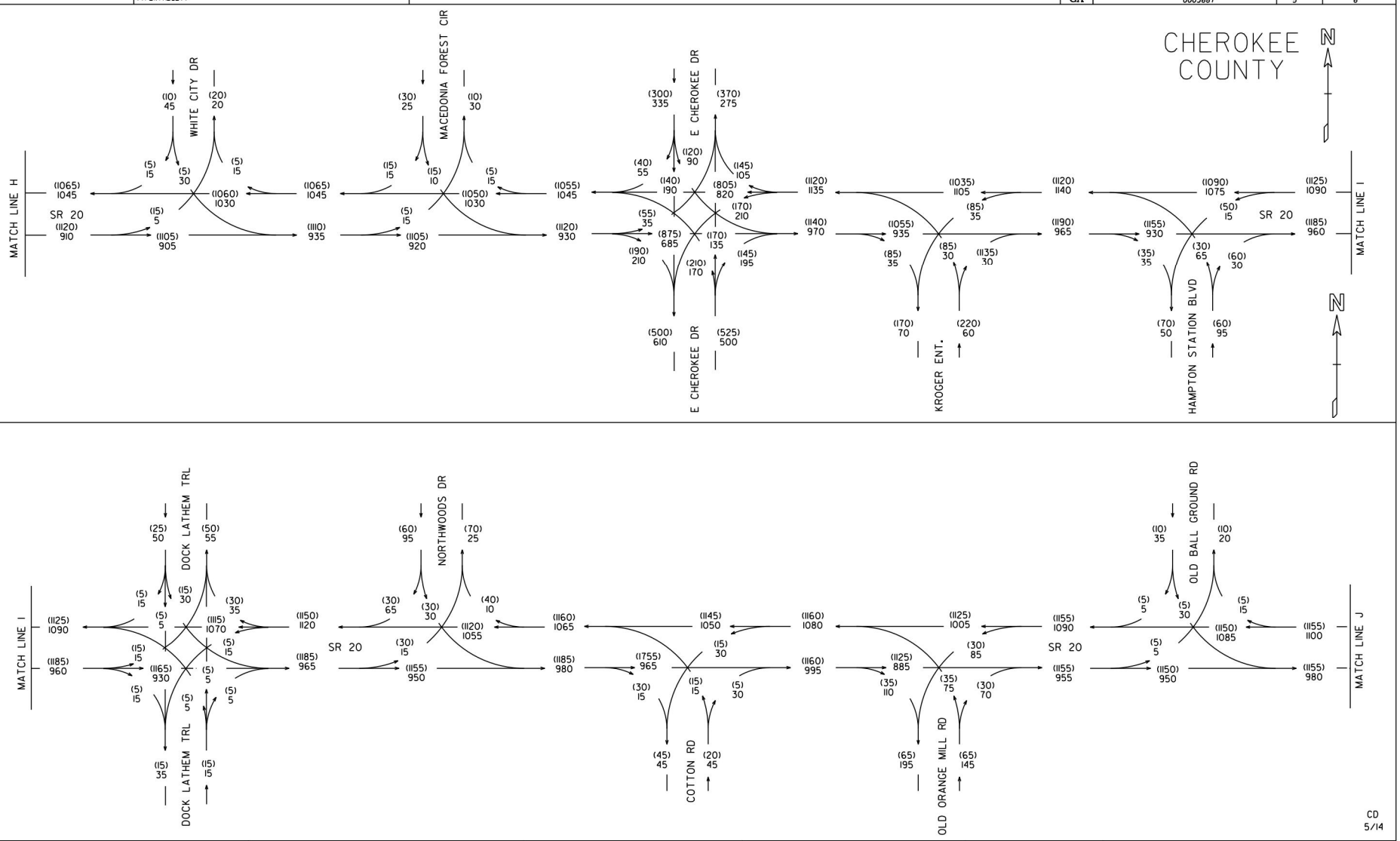
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-28

12/14/202 GPLN

DATE$$$ $USER$	TIME$$$	$PRF8$ $$PENTABLE$$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
				GA	0003681	5	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

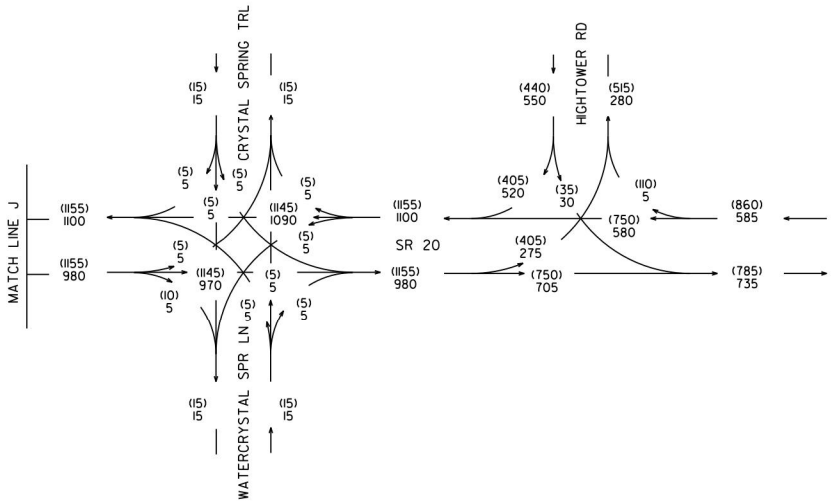
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-29

12/14/202 GPM

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	6	6



CHEROKEE COUNTY

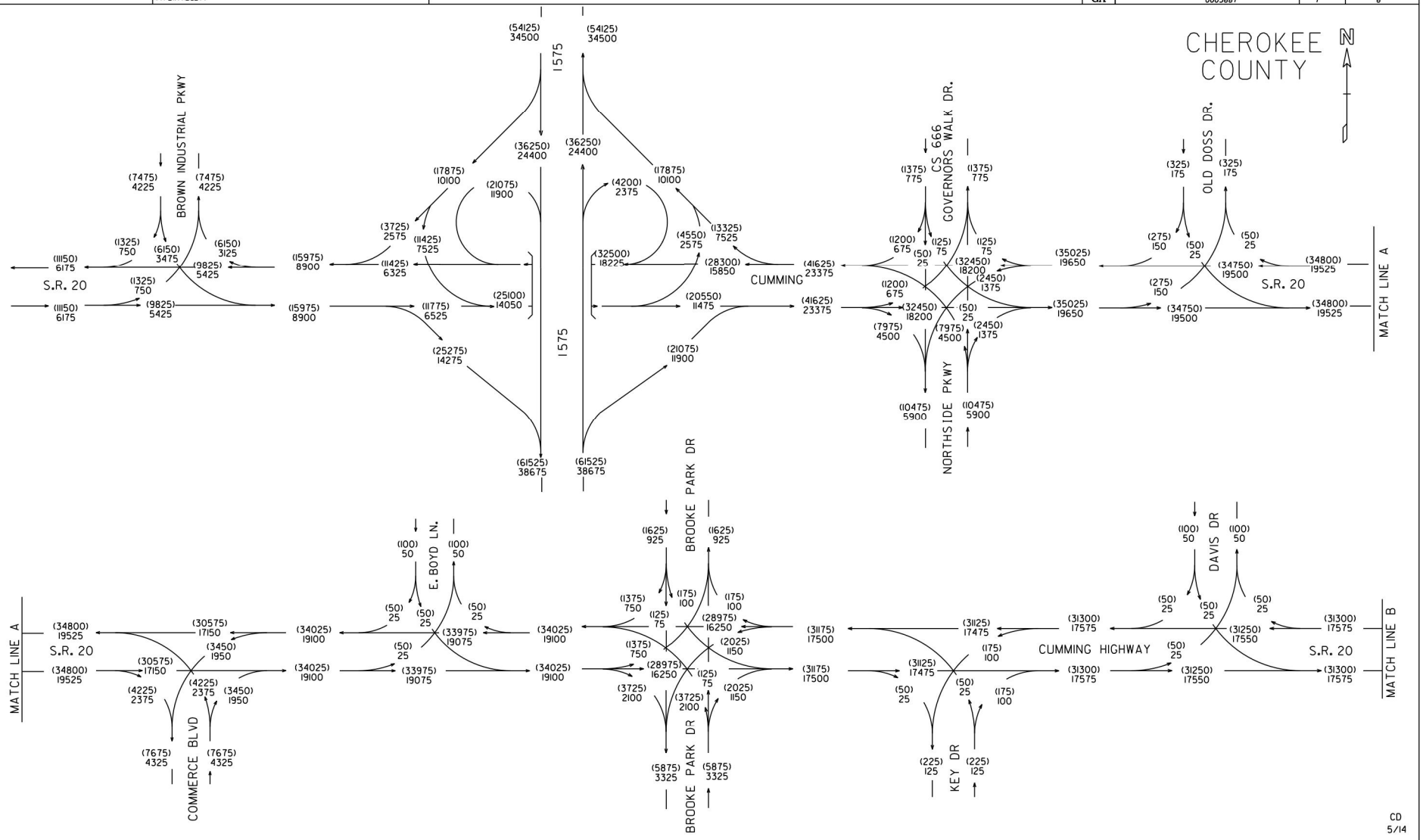
N

CD
5/14

STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2045 NO BUILD PM DHV = (000) 2045 NO BUILD AM DHV = 000	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	T = 12.5% S.U. = 7.5% COMB. = 5%	REVISION DATES STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-30

12/14/2012 GPLN

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	1	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

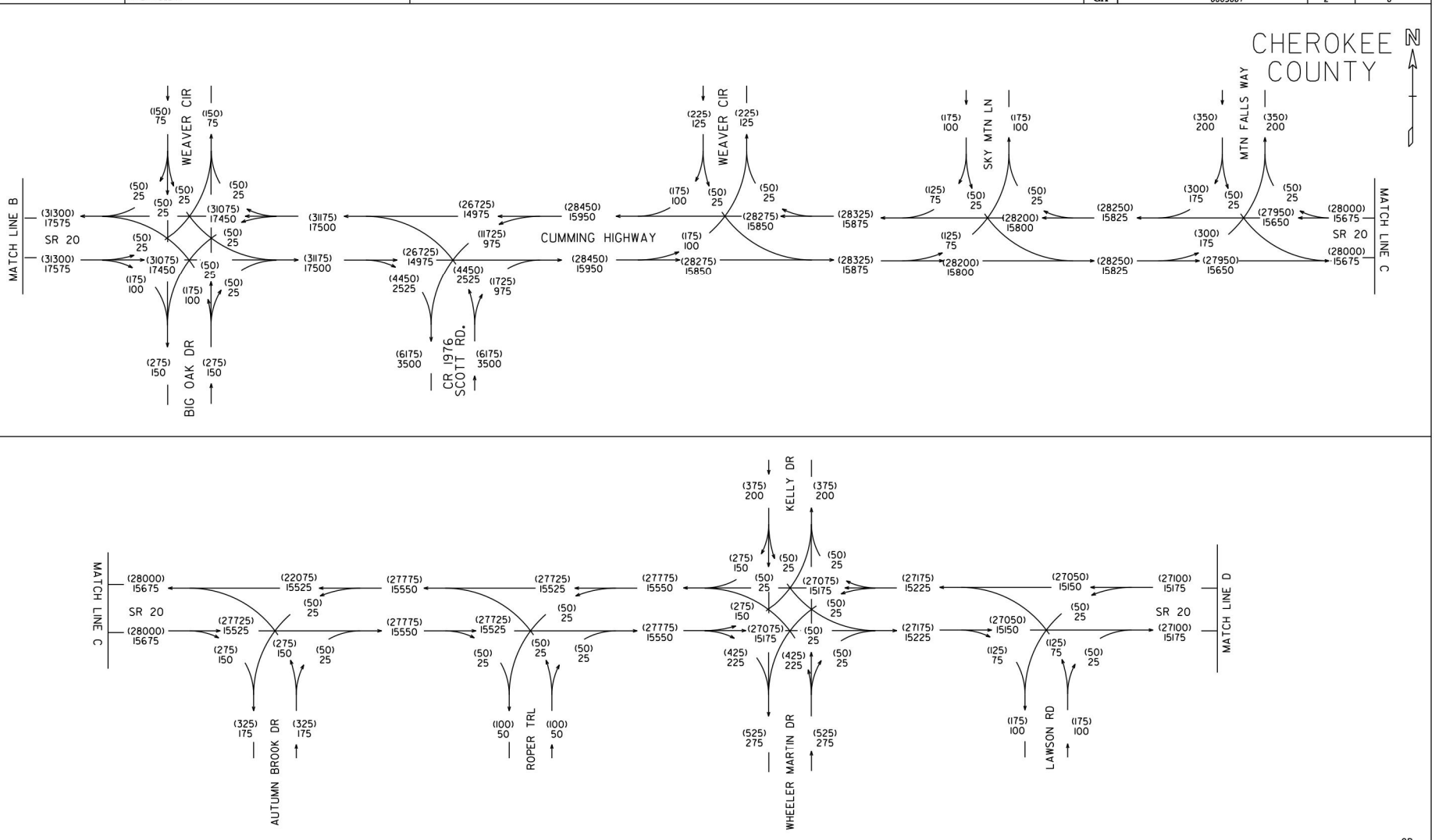
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-31

12/14/2012 GPLN

DATE$$	TIME$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

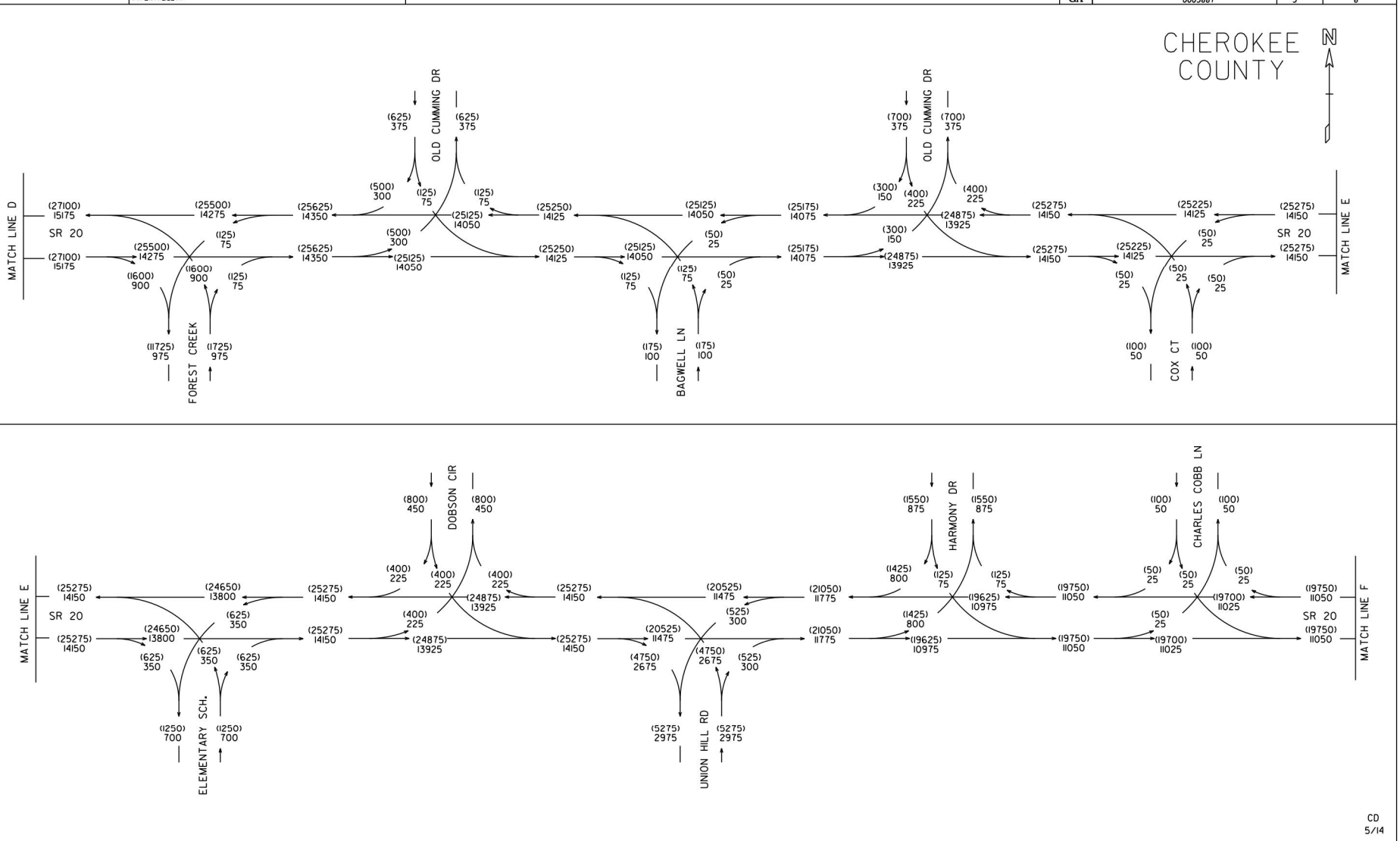
REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-32

12/14/202 GPL#

DATE$$	TIME$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	3	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

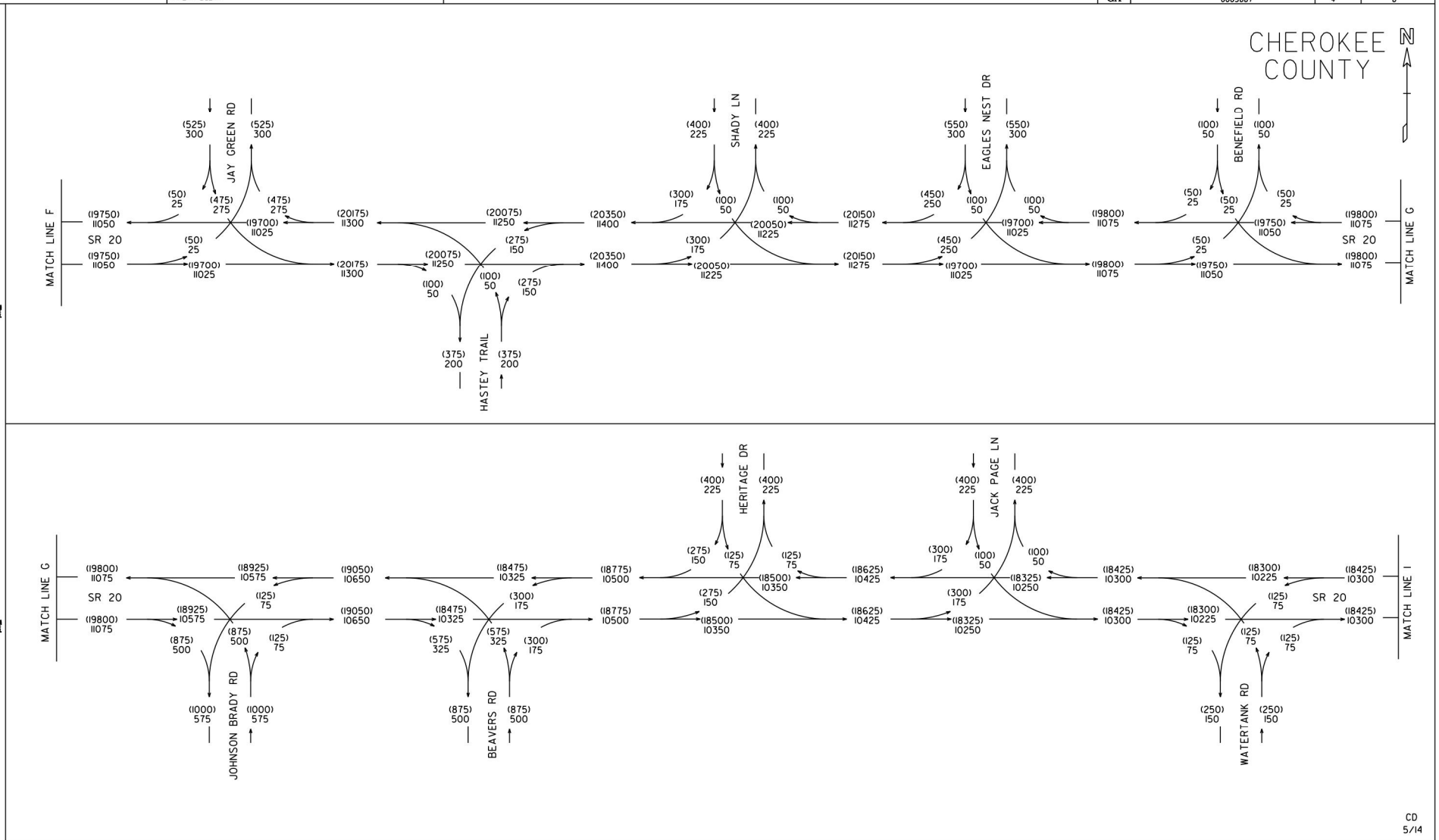
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-33

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

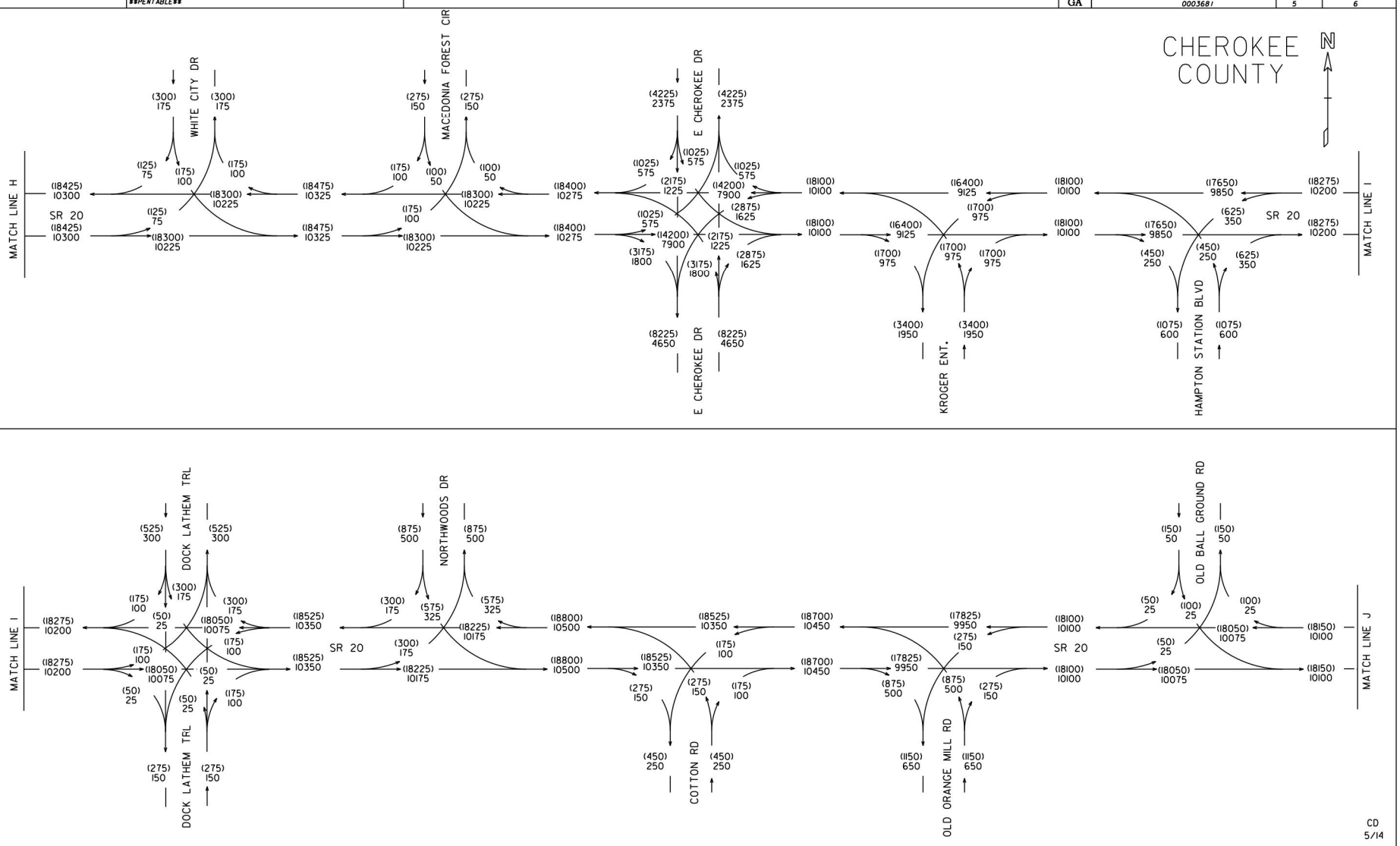
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-34

12/14/2012 GPM

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	5	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

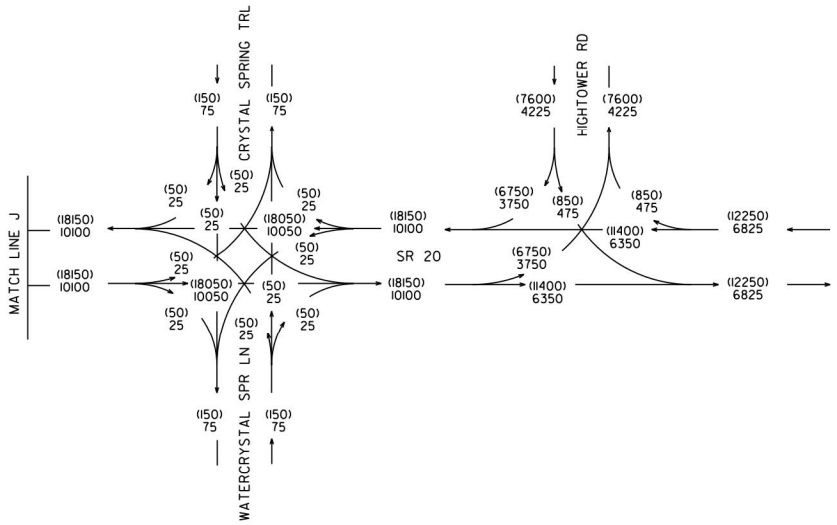
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-35

12/14/2012 GPU

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	6	6



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

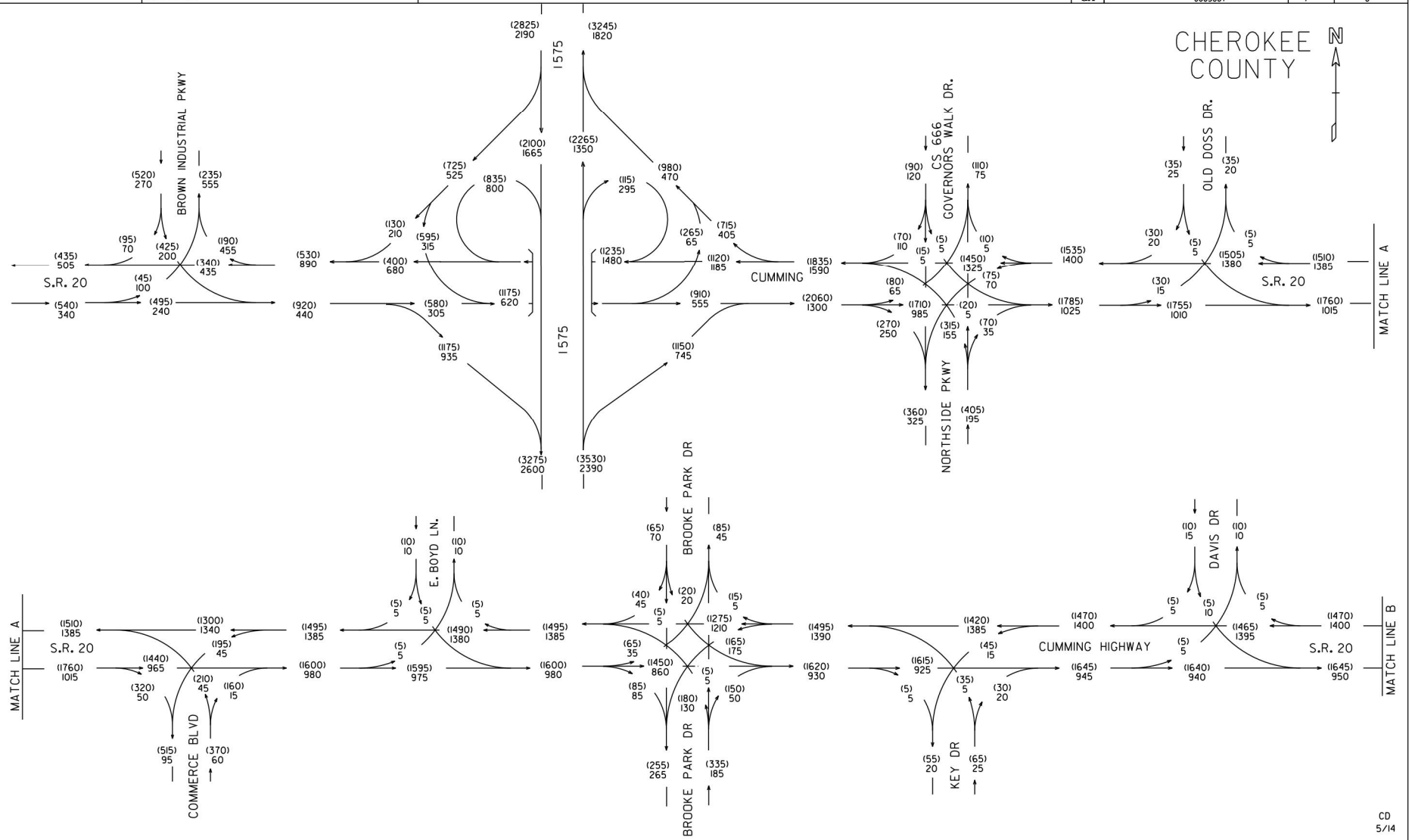
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-36

12/14/2012 GPLN

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	1	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

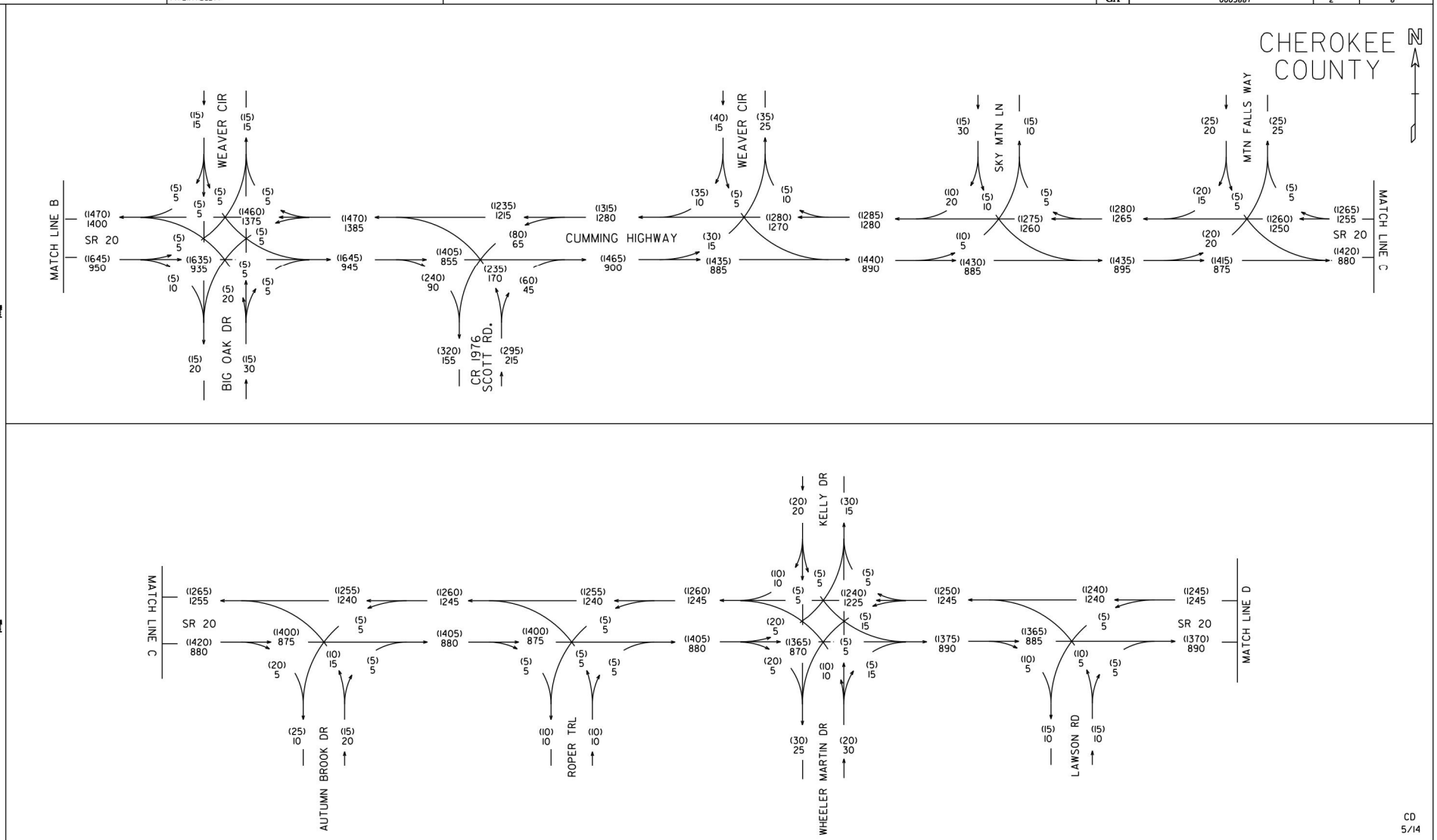
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-37

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	2	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

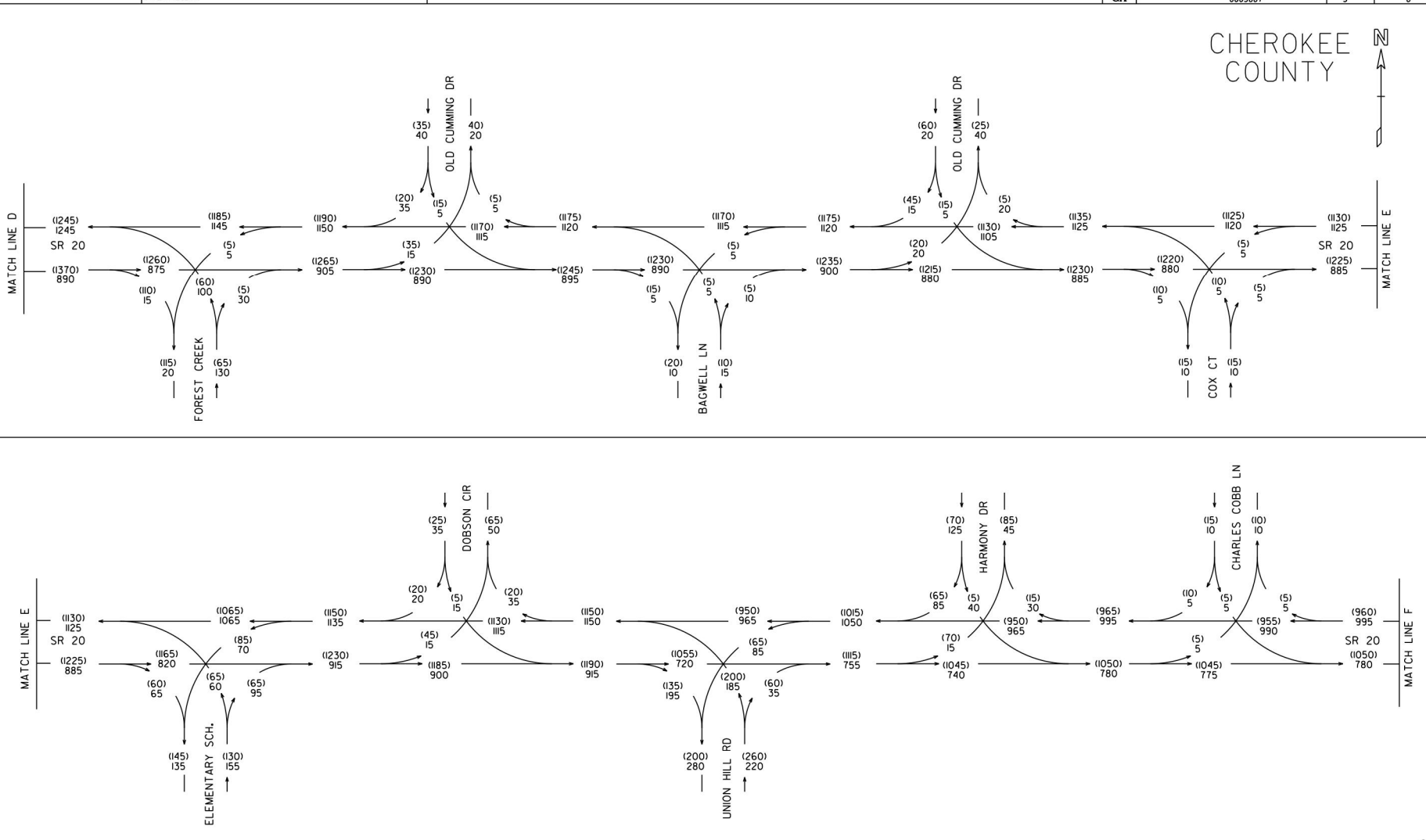
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-38

12/14/2012 GPM

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	3	6



CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

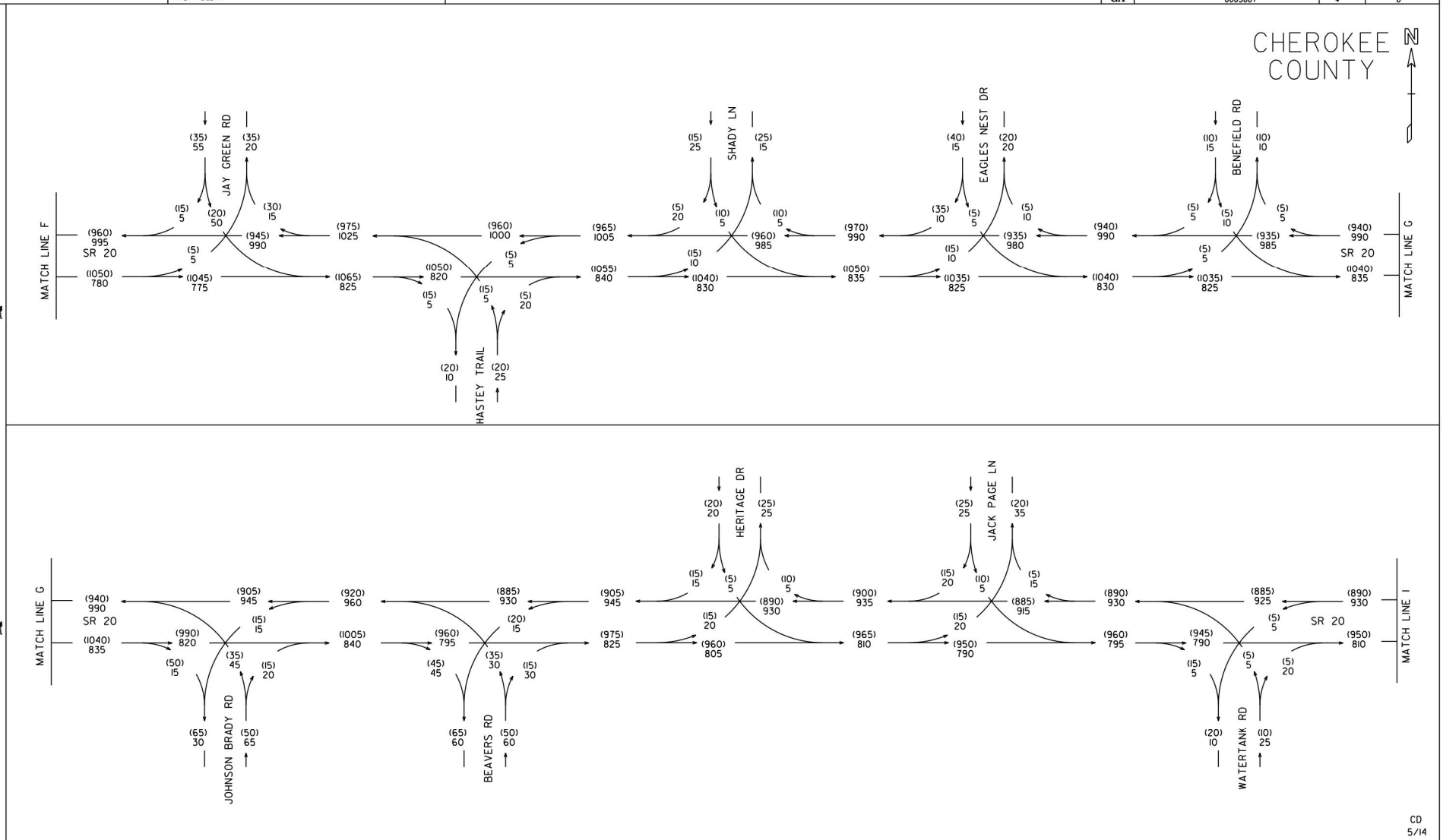
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-39

12/14/2012 GPLN

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	4	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

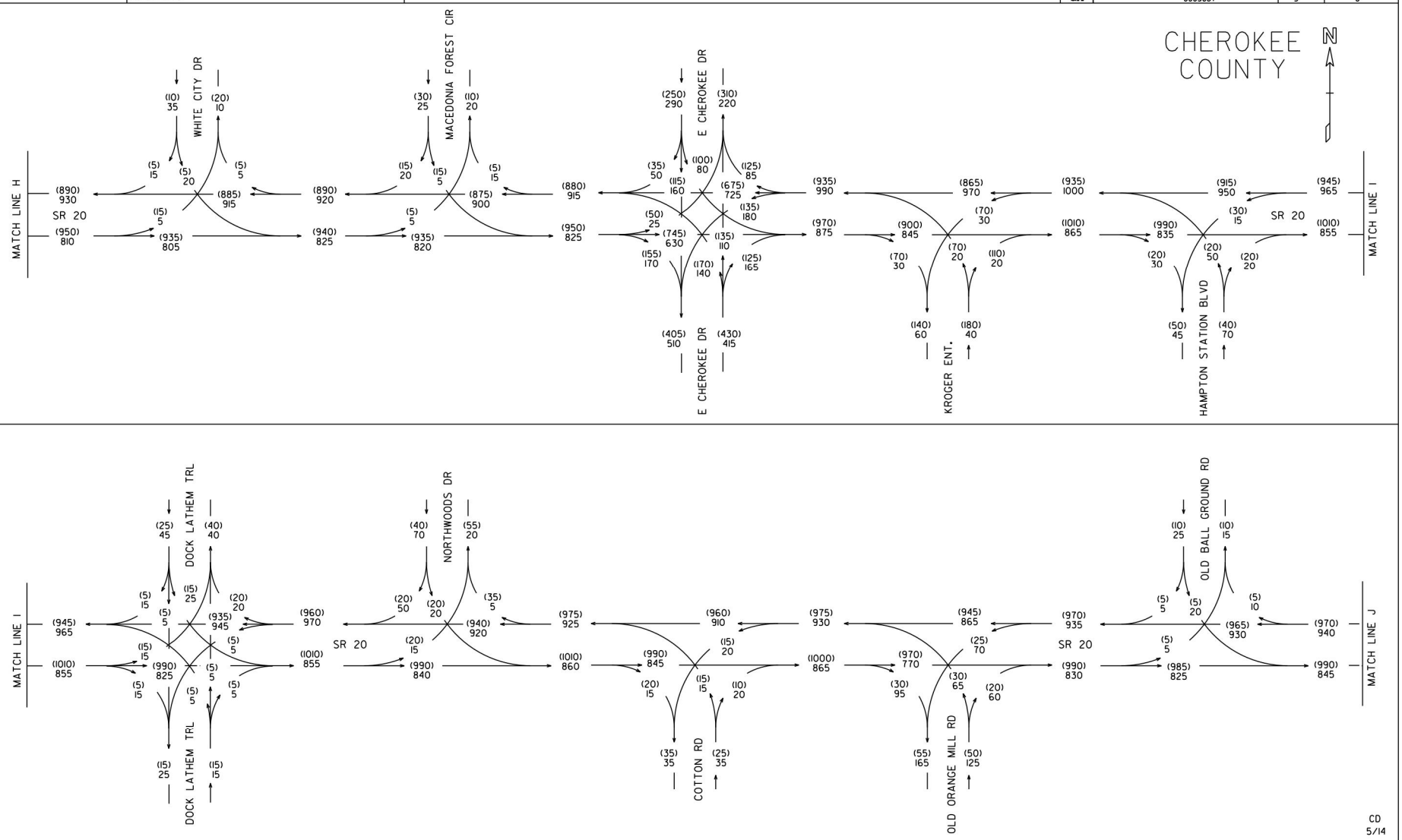
REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-40

12/14/2012 GPLN

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	5	6



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

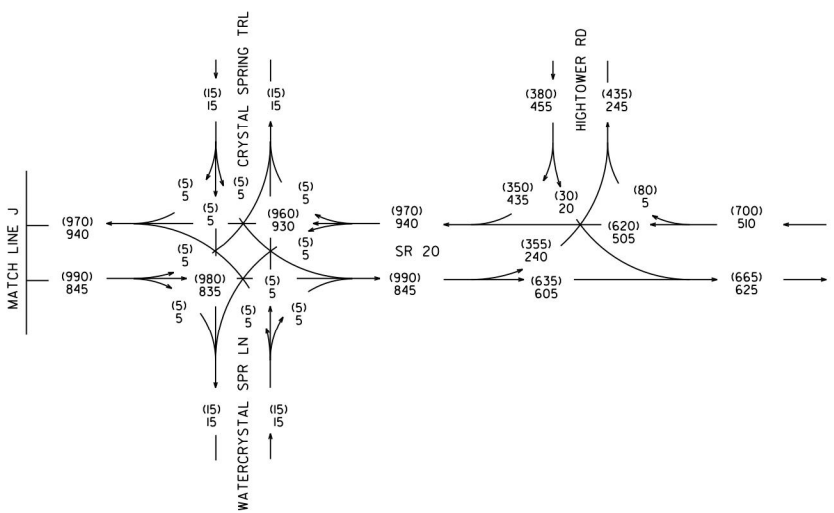
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-41

12/14/2012 GPL#

DATE$$$	TIME$$$	$PRF8$	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		GA	0003681	6	6



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

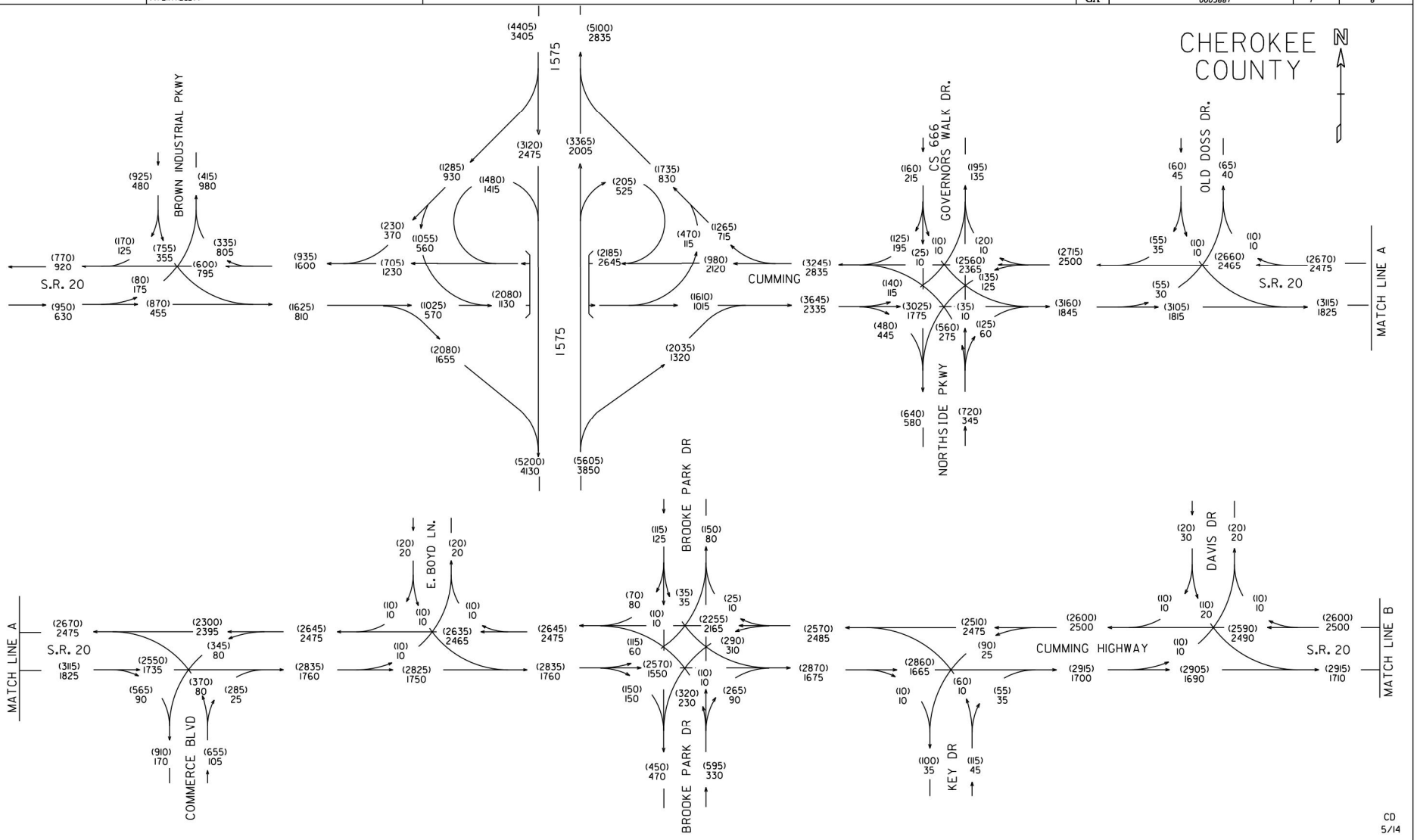
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-42

12/14/202 GPLN

DATE$$$	TIME$$$	PRF	DGN	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$	$$PENTABLE$$			GA	0003681	1	6



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5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-43

12/14/2012 GPU

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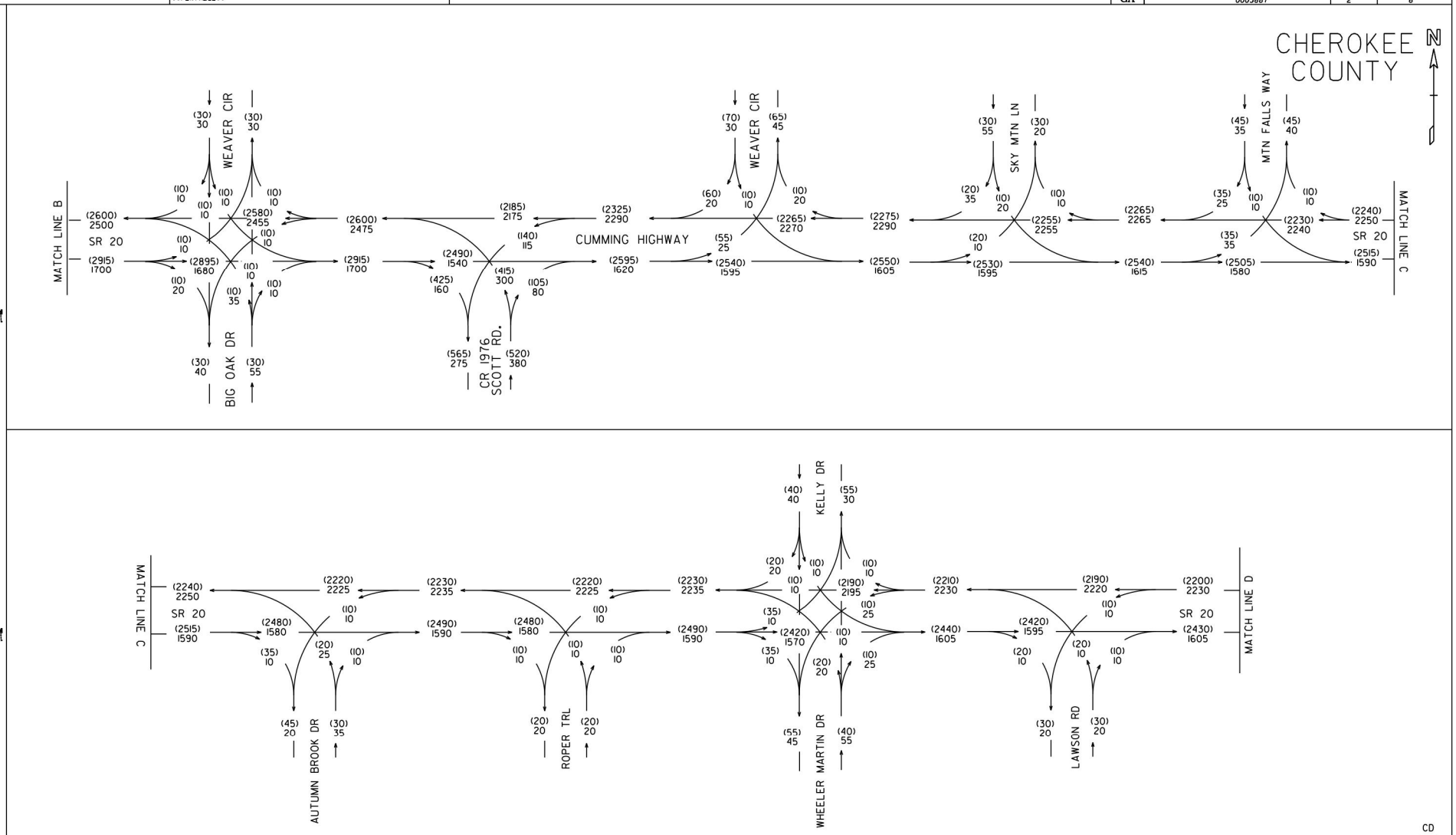

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
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ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-44

12/14/2012 GPLN

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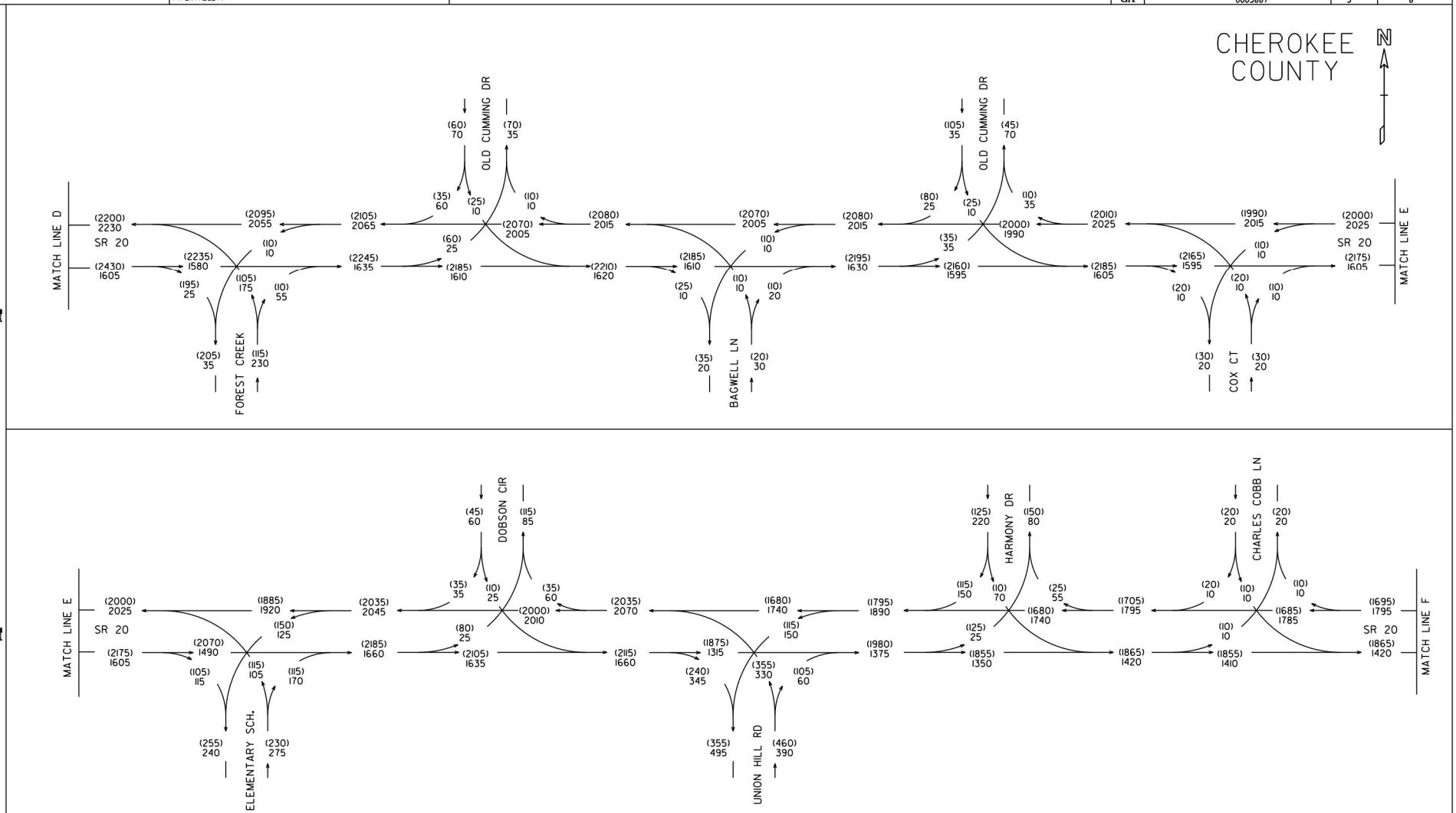

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
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ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-45

12/14/2012 GPLN

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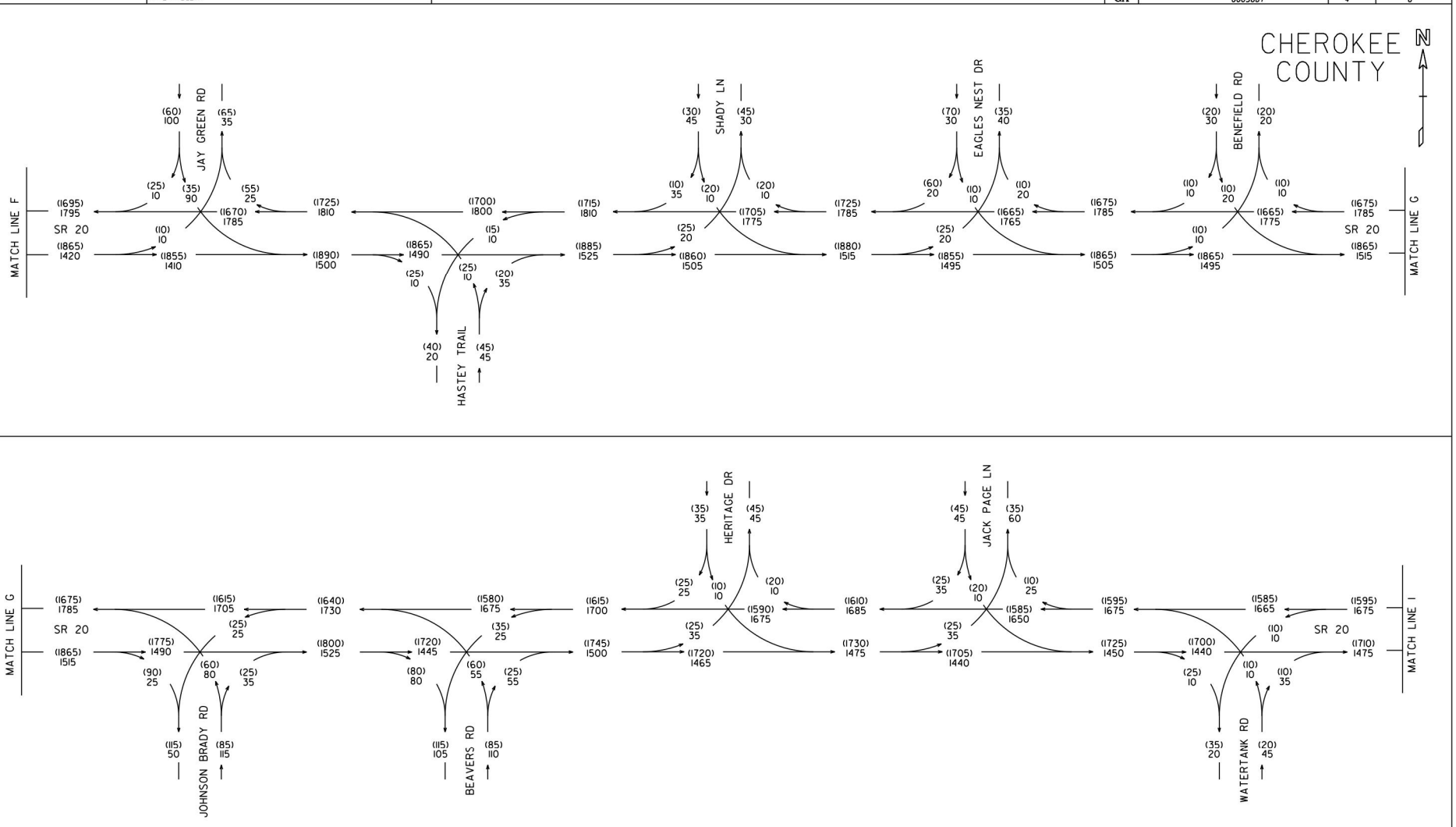

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5/14

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12/14/202 GPLN

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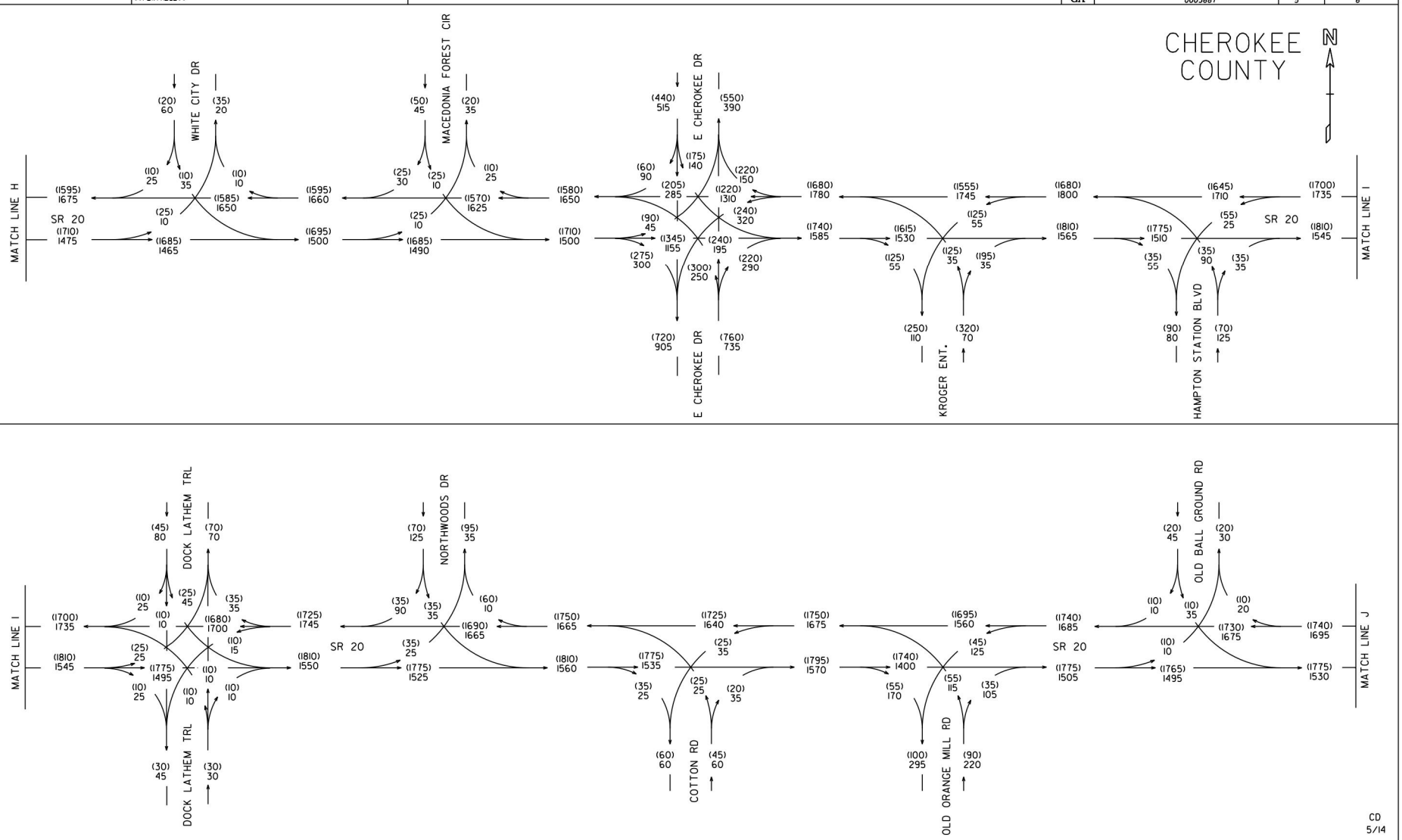

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY

S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-47

12/14/202 GPLN

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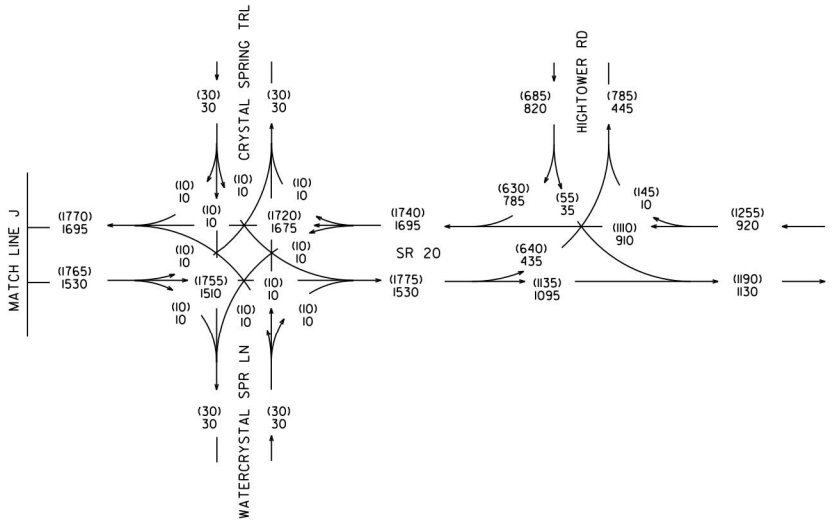


CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681) P.I.# 0003681 CHEROKEE COUNTY S.R. 20 FM I-575 TO SR369	2045 BUILD PM DHV = (000) 2045 BUILD AM DHV = 000	GCA, INC. 1800 PEACHTREE STREET, N.W. SUITE 825 ATLANTA, GEORGIA 30309 PH. 404-355-4010 FAX 404-355-0604	T = 12.5% S.U. = 7.5% COMB. = 5%	REVISION DATES STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: PLANNING TRAFFIC DIAGRAM DRAWING No. 10-48

12/14/202 GPLN

Attachment 6

Roundabout Data

Dunnahoo, Lindsey

From: Law, Nicole <nlaw@dot.ga.gov>
Sent: Tuesday, August 30, 2016 5:55 PM
To: Gero, Scott
Cc: Dunnahoo, Lindsey; Wood, Jeff
Subject: FW: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Scott,
Please see the recommendation below in regards to your concerns about considering a roundabout in the 6-lane sections.

Thanks,

Nicole S Law
Phone: (404) 631-1723
Mobile: (404) 807-7424

From: Barry, Christina
Sent: Tuesday, August 30, 2016 5:14 PM
To: Law, Nicole
Cc: Zehngraff, Scott E.
Subject: RE: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Hi Nicole,

We agree that the consultant does not need to consider roundabouts in the six lane section. However, we would recommend that they consider restricted crossing u-turns or median u turns as possible alternatives for these intersections. Please let me know if you have any additional questions.

Thanks!

Christina D. Barry, PE
Traffic Operations Supervisor
Office of Traffic Operations
Georgia Department of Transportation
935 E. Confederate Avenue, Bldg. 24
Atlanta, GA 30316
cbarry@dot.ga.gov
Phone: (404) 635-2922

From: Law, Nicole
Sent: Wednesday, August 24, 2016 5:25 PM
To: Barry, Christina
Subject: FW: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Christina,
Is this your area of expertise or does it go to Design Policy & Support? Do you mind pointing me in the right direction to answer the concerns of my consultant below?

Thanks,

Nicole S Law
Phone: (404) 631-1723
Mobile: (404) 807-7424

From: Gero, Scott [mailto:Scott.Gero@aecom.com]
Sent: Wednesday, August 24, 2016 3:59 PM
To: Law, Nicole
Cc: Dunnahoo, Lindsey; Wood, Jeff
Subject: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Nicole,

Can you reach out to Scott Zehngraff or whoever is appropriate to confirm that we do not need to evaluate or consider roundabouts on a 6-lane arterial? I understand according to Chapter 8 of the DPM that if we have an ADT that exceeds 45,000 vehicles, then we no longer need to consider a multi-lane roundabout. This is the case from Scott Rd to Union Hill Road. However, east of Union Hill Rd to SR 369, we are proposing 6 lanes with an ADT less than 45,000 in our design year. Therefore, before we advance the concept report and not address or evaluate roundabouts in our 6-lane section, I just want to make sure that GDOT Traffic agrees that roundabouts do not need to be considered for 6-lane sections.

> For a roundabout to be a reasonable solution, the opening and design year volumes for tr
> entering the roundabout from the major road should be less than 90% of the total volume
> the roundabout.
>
> **Table 8.1. Planning-level Thresholds for Single-Lane and Two-Lane Roundabou**
>
> | No. of Circulatory Lanes | ADT[1] (design year) | % Traffic on Major R (opening & design ye |
> |---|---|---|
> | **Single-lane** | < 25,000 | < 90 |
> | **Two-lane** | < 45,000 | < 90 |
>
> [1]Based on traffic entering the circulatory roadway for a four-leg roundabout. A reasonable approximation for a three-leg roundabout is 75% of the values shown abo
> [2]The volume of traffic entering the roundabout from the major road divided by the tota traffic volume entering the roundabout, as a percentage.
>
> If traffic volumes exceed the maximum ADT thresholds shown in Table 2.1 (i.e., 45,000 ar or if site conditions are unfavorable to a roundabout, an acceptable conventional intersect may be selected without further evaluation. Nevertheless, a roundabout may still operate l than a conventional intersection and may be carried forward for more detailed considerati of a roundabout feasibility study.

Thank you,

Scott A. Gero, P.E.
Project Manager
SR 20 Improvements from Canton to Cumming
PI No's: 0014131, 0014132, 0014133, 0002862, 0003682
http://www.dot.ga.gov/BuildSmart/Projects/Pages/I575SR400.aspx

AECOM
400 Northpark Town Center
1000 Abernathy Rd. NE, Suite 900
Atlanta, GA 30328
T 678.808.8800 F 678.808.8400
www.aecom.com

It's Georgia Department of Transportation's centennial! We were founded on August 16, 1916. The Department's work over the last century has contributed to a treasured quality of life for Georgians and to the incredible economic development of the Peach State. Georgia DOT has served for 100 years with simply the best in safety, service and innovation. And we will continue to embrace change, encourage innovation, meet new challenges and break new barriers as the next hundred years unfold. For all things Centennial, visit www.dot.ga.gov/Centennial.

Attachment 8

Minutes of Concept Meeting

AECOM
1360 Peachtree Street NE,
One Midtown Plaza, Suite 500
Atlanta, GA 30309
www.aecom.com

404 965 9600 tel
404 965 9605 fax

SR 20 Improvements from Canton to Cumming
PI No's: 0014131, 0014132, 0014133, 0002862, 0003682

AECOM Proj.: 60507210 (File 60267130)

Meeting Agenda

Subject: Concept Team Meeting for SR 20 Corridor Improvements (Canton to Cumming)

Date: March 10, 2017

Location: GDOT – Rm 409

Attendees:

Cynthia Burney – GDOT
Nicole Law – GDOT Outgoing PM
Cleopatra James – GDOT Incoming PM
Scott Gero – AECOM PM
Laura Dawood – AECOM Environmental
Lindsey Dunnahoo – AECOM Engineer
Paola Rojas – AECOM Engineering
Chad Bishop – AECOM Engineer
Chandria Brown – GDOT
R Lawrence – GDOT Planning
Angela Turner – GDOT Design Policy
Aaron Burgess – GDOT NEPA
Chris Raymond – GDOT TMC
Jim Pomfret – GDOT OES
Walt Taylor – GDOT Engineering Services
Erik Rohde – GDOT Engineering Services
Chuck Hasty – GDOT Engineering Services
Chesleion Charles – Southern Company Gas

District 1:
Tina Apperson – GDOT
Lynn Palmer – GDOT Utilities
Kevin York – GDOT R/W
Harold D. Mull – GDOT DCE
Pete Hughes – SEMC
Ted Brown – SEMC
Mike Souther - Windstream

District 6:
Barry Hensley – Assistant Construction Manager
Bethany Watson – Assistant City Engineer (Canton)
David Hatabian – City Engineer (Canton)
Geoff Morton – Cherokee County
Jennifer Deems – GDOT Utilities
Duane Fant – District 6 R/W
Dee Carson – District 6 Traffic Ops
David Acree – District 6 Pre-Construction
Keith Day – District 6 Area Mngr
Brian Whelchel – District 6 Asst Area Mngr
Grant Waldrop – GDOT Traffic Ops
John Gay – Engineer (Georgia Power)
Drace Farrell – Engineer (Windstream)

- Introduction of SR 20
  - Map – See Attachment 1
  - History
  - Screen 2 Alternatives => Widen Existing – See Attachment 2.
  - Accelerated Schedule
    - Streamlined PFPR in April
    - Right of Way in June
    - Standard PFPR in late fall/early winter
  - Modified PDP
- Concept Report
  - Proj Justification
  - Need & Purpose
  - Traffic / Lane Call
    - See Attachment 3 for laneage demand determination
    - Goal: LOS D for entire corridor
  - Functional Classification – See attachment, Urban/Rural Arterial.
  - Typical Section:
    - Urban vs. Rural – Urban typical to minimize impacts, to stay consistent with the development patterns in the area, and help with MS4 design.
    - Drainage/MS4 – project approach – Approach is to catch, treat, and detain all water that falls on the road. Offsite runoff will be conveyed in a separate system from the onsite runoff.
    - 11' & 12' lanes
      - Per VE study recommendation, the typical section is being revised to 11' inside lanes and a 12' outside lane.
      - Harold recommended one 11' inside lane, with a 12' middle and outside lane for truck accomodations.
    - Sidewalk and multi-purpose paths – Cherokee County has a planned trail from Cherokee Veterans Park to Smithwick Creek. Forsyth County has a planned trail from Spot Rd to Sawnee Mountain as well as on the east side of Post Rd.
    - Pavement Design – Rigid vs. Flexible – PES & PTS requested in August, 2016.
  - Design Speed: 45 vs 55 mph => Escalation Memo or Concept Report
    - AECOM will put together an escalation memo for 45 mph
      - Cynthia went to the public meeting hosted by Senator Brandon Beach. A question was raised about the speed limit on the road and the public seemed OK with 45 mph.
  - Draft VE Study Recommendations – See Attachment 4 for draft responses to the draft recommendations. The team is waiting for the final VE Study Report.
  - Utilities – SUE
    - How can we accelerate utility conflict resolution (relocation determination) to achieve comfort with R/W needs by June?
      - Dictate where utilities can go on a typical section
      - Hold workshops for utility coordination with each district and invite utility owners
  - R/W: (120' – 250'+)

        - Encompass all needs as R/W or only to Shoulder Breaks and easement beyond? Both District 1 and District 6 prefer to have right of way everywhere to make it easier for utility relocations. Right of way should be evaluated on a case by case basis (i.e. use easements to save a parking lot).
        - Kevin York will be coordinating right of way for the entire corridor
    - Access Control/Innovative intersections:
        - R-Cuts
        - Median U-turns (Michigan Lefts) – SR 371/Post Rd, Bethelview Rd
    - Context Sensitive => NEPA => Avoid, Minimize & Mitigate
        - Meeting with USACE 3/16 to review alignment (USACE is lead federal agency due to need for permit to impact Waters of the US)
    - ROLL PLOTS of Concept Layout
        - School Drwy Access at Freehome Elementary
            - Geoff will coordinate with Freehome Elementary about access - AECOM to send PDF.
        - Drwy at McDonald's
            - All agreed with closing the Dec 2016 PIOH proposed right in/right out driveway at McDonalds. There is not enough room to add a deceleration lane without significant displacement of parking spots adjacent to the road. Three access points will still be viable from E Cherokee Drive as well as from two location from SR 20 (at light to Kroger and one right in/right out drwy at east end of strip plaza. There is interparcel access currently available and it will remain with the proposed improvements.
    - Environmental Permitting:
        - USACE (Lead Agency) – PAR - Submitted 3/1
        - Public Involvement – Next PIOH after Streamlined PFPR and before R/W (May). The intent is to show the actual propose R/W and easements to allow for one final look and comment to tweak before finalizing R/W Plans.
    - Construction: (Constructability to be combined w Streamlined PFPR)
        - The majority of the project should be pretty straightforward to construct as we are widening a 2-lane to a 6-lane divided. This large widening will create plenty of space and opportunity to maintain traffic on one side while constructing the other side. There are not many changes proposed to the mainline profile which further simplifies staging.
        - Show cross sections with retaining walls and staging cross sections at critical stations.
        - Detours will not be needed for mainline construction. Some side roads may need detours (TBD) running traffic on temporary gravel surfaces.
    - Other
        - Concern that the signals at East Cherokee and Kroger are too close. Per district traffic, the signals are close enough to be co-ordinated and are not an issue. These are existing signal locations.
        - Evaluate the pond in the southwest corner of the Union Hill intersection to see if it can be moved closer to SR 20 (there is a planned development in this parcel)
        - Add the multi-use trails to the typical sections in the Concept Reports

- OK to cut off Franklin Goldmine from SR 20 (cul-de-sac near SR 20)
- Angela asked about the intersections that are shown to fail in the design year. AECOM to determine what year these intersections will fail.
- Pipe Clearance – Need a variance to reduce clearance requirements
    - Up-class the pipe
    - Steel en-case the pipe
    - Switch to an elliptical pipe
- Add TIP #FT-313 to concept report for 0003682

SR20 Concept Team Meeting
PI 0003681

MEETING SIGN-IN SHEET

Project: SR 20	**Meeting Date:** March 10, 2017
Facilitator: Nicole Law/Scott Gero	**Place/Room:** OGC 409

Name	Company	Phone	E-Mail
Laura Dawood	AECOM	770.548.9904	Laura.dawood@aecom.com
Chad Bishop	AECOM	404-965-7050	chad.bishop@aecom.com
Cynthia Burney	GDOT	4-631-1851	cburney@dot.ga.gov
Nicole Law	GDOT	4-631-1721	nlaw@dot.ga.gov
Cleopatra James	GDOT	4-631-1546	Cjames@dot.ga.gov
CHESLEIGH CHARLES	SOUTHERN COMPANY GAS	4.584.3257	Ccharles@southernco.com
Chandria Brown	GDOT	4)631-1580	chbrown@dot.ga.gov
ROSHNI LAWRENCE	GDOT - PLANNING	404 631 1774	RDLawrence@dot.ga.gov
Angela Turner	GDOT Design Policy	404)631-1736	Arturner@dot.ga.gov
Scott Gero	AECOM	404) 965-9726	scott.gero@aecom.com

MEETING SIGN-IN SHEET

Project: SR 20	**Meeting Date:** March 10, 2017
Facilitator: Nicole Law/Scott Gero	**Place/Room:** OGC 409

Name	Company	Phone	E-Mail
Lindsey Dunnahoo	AECOM	404-965-9516	lindsey.dunnahoo@aecom.com
Aaron Burgess	GDOT NEPA	404-631-1159	aburgess@dot.ga.gov
Chris Raymond	GDOT TMC	404-635-2814	cdraymond@dot.ga.gov
Jim Pontiet	GDOT OES	404.631.1256	jpontiet@dot.ga.gov
WALT TAYLOR	GDOT - ENG SERV	4.631.1922	WTAYLOR@DOT.GA.GOV
Erik Rohde	GDOT ENG SERV	4046311611	erohde@dot.ga.gov
Chuck Hasty	GDOT Eng Svcs	404.631.1717	Chasty@dot.ga.gov

Co	Name	eMail	Phone
SEMC	Pete Hughes	Pete.hughes@sawnee.com	678-455-1393
SEMC	TED BROWN	TED.BROWN@SAWNEE.COM	678-455-1552
GDOT	Tina Apperson		
G.DOT-Util.	Lynn Palmer	jlpalmer@dot.ga.gov	770-531-5752
GDOT-R/W	Kevin York	Kyork@dot.ga.gov	770-531-5584
GDOT-DCE	HAROLD D. MULL	hmull@dot.ga.gov	770-531-5769
WINDSTREAM	MIKE SOUTHER	MIKE.SOUTHER@WINDSTREAM.COM	404-831-0415

Concept Team Meeting- Cherokee Co 0003681
3/10/2017 Sign In

NAME	TITLE	EMAIL
Garry Hensley	Asst Construction Manager	garryhensley@ccwsa.com
Bethany Watson	Asst City Engineer - Canton	bwatson@canton-georgia.com
DAVID HATAJIAN	C-ry ENGINEER	DAVID.HATAJIAN@CANTON-GEORGIA.COM
GEORGE MORTON	CHEROKEE COUNTY	gmorton@cherokeega.com
Jennifer Deems	GDOT-Utilities	jdeems@dot.ga.gov
JOHN GRAY	ENG. - GA. POWER	JCGRAY@SOUTHERNCO.COM
DRAKE FARRELL	ENG - WINDSTREAM	Drake.A.Farrell@windstream.com
Duane Fant	D6 RW	dfant@dot.ga.gov
DEE CARSON	D6 T-OPS	dcarson@
DAVID ACREE	D6 Pre-const	dacree@
KEITH DAY	D6 AM	Kday@dot.ga.gov
Brian Whelchel	D6 AAM	bwhelchel@dot.ga.gov
Grant Waldrop	GDOT - Traffic OPS	GWaldrop@dot.ga.gov

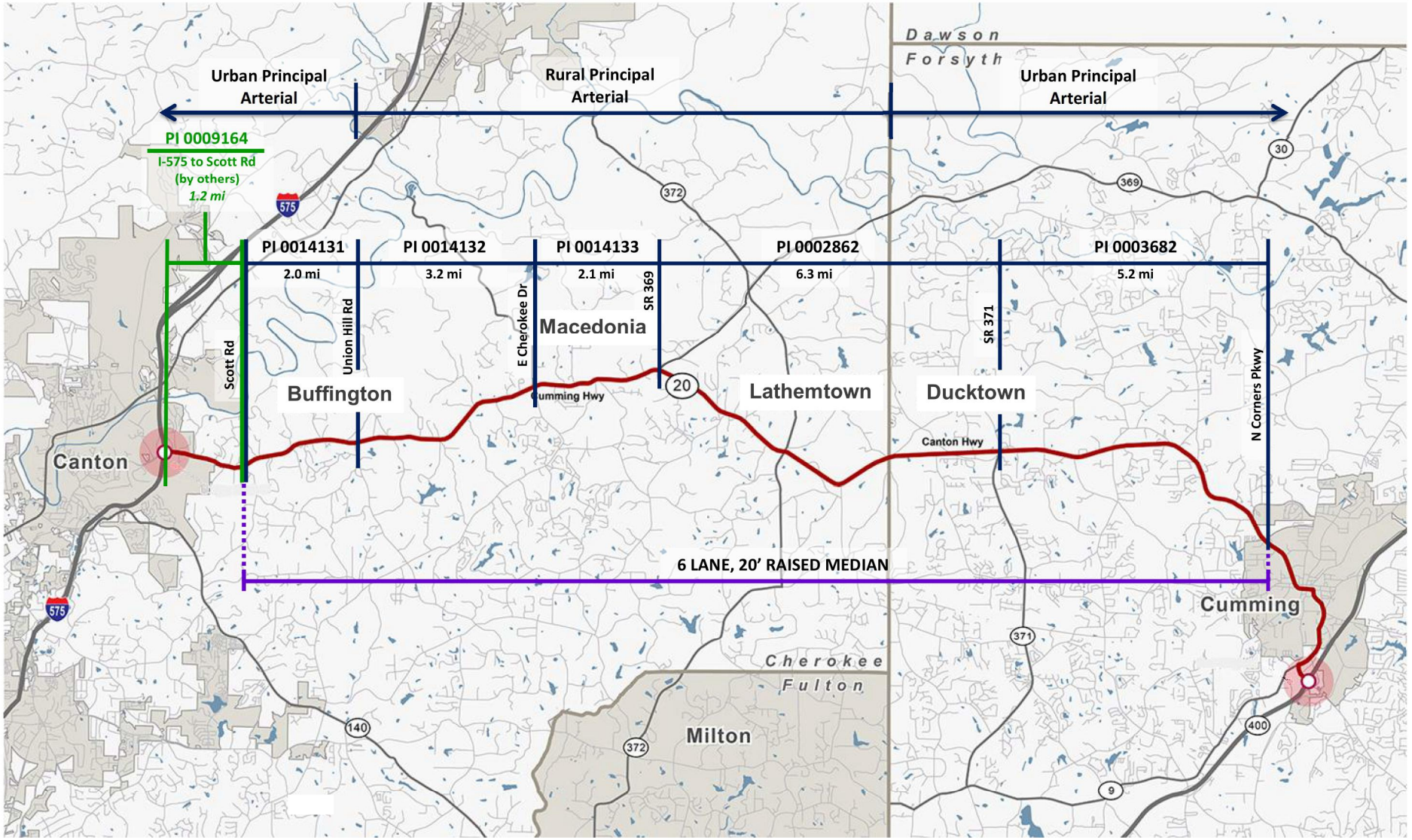
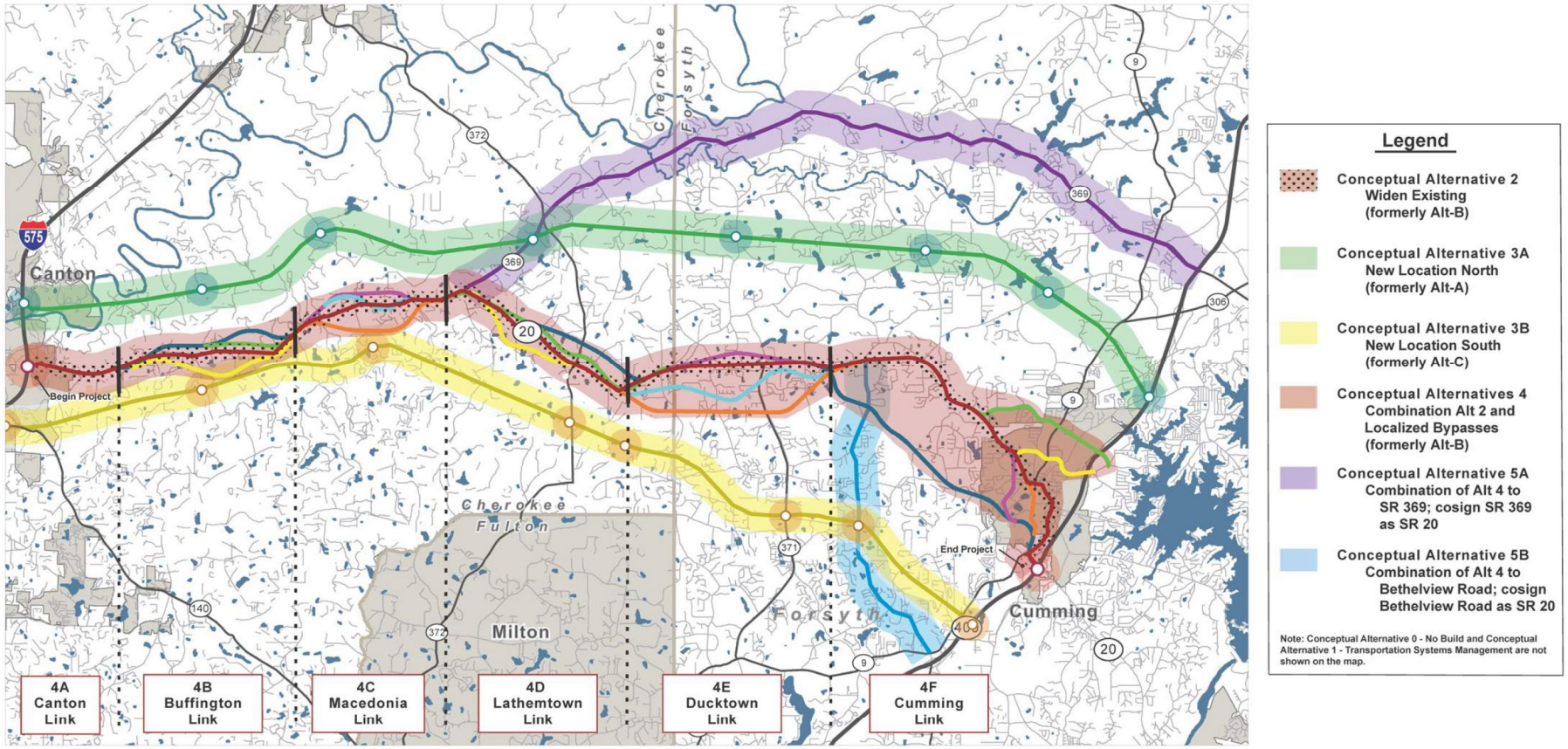

Urban Principal Arterial
Rural Principal Arterial
Urban Principal Arterial
PI 0009164
I-575 to Scott Rd
(by others)
1.2 mi
PI 0014131
2.0 mi
PI 0014132
3.2 mi
PI 0014133
2.1 mi
PI 0002862
6.3 mi
PI 0003682
5.2 mi
Scott Rd
Union Hill Rd
E Cherokee Dr
SR 369
SR 371
N Corners Pkwy
Buffington
Macedonia
Lathemtown
Ducktown
Canton
Canton Hwy
6 LANE, 20' RAISED MEDIAN
Cumming
Milton
Dawson
Forsyth
Cherokee
Fulton
575
372
369
30
20
371
400
140
9

Figure 1.3 Conceptual Alternatives



Conceptual Alternatives Map

SR 20 Laneage Needs Based on Peak Hour Directional Volumes

Between Street 1	Street 2	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Design 2045	PI Number	Proposed Typical Section
Brown Industrial	I-575 SB	600	600	600	600	620	641	663	686	709	733	758	784	811	838	867	892	918	945	972	1000	1029	1059	1090	1121	1154	1187	1222	1257	1294	1331	1370	1410	1450	1492	1536		
I-575 SB	I-575 NB	700	700	700	700	724	748	774	800	827	856	885	915	946	978	1011	1040	1070	1102	1133	1166	1200	1235	1271	1308	1346	1385	1425	1466	1509	1552	1597	1644	1691	1740	1791		
I-575 NB	Northside Parkway	1365	1365	1365	1365	1411	1459	1509	1560	1613	1668	1725	1784	1844	1907	1972	2029	2088	2149	2211	2275	2341	2409	2479	2551	2625	2701	2779	2860	2943	3028	3116	3206	3299	3395	3493	0009164	6-Lanes w 20' Raised Median
Northside Parkway	Old Doss Dr	2270	2270	2270	2270	2347	2427	2510	2595	2683	2774	2869	2966	3067	3171	3279	3374	3472	3573	3676	3783	3893	4005	4122	4241	4364	4491	4621	4755	4893	5035	5181	5331	5486	5645	5808		
Old Doss Dr	Commerce Blvd	2285	2285	2285	2285	2363	2443	2526	2612	2701	2793	2888	2986	3087	3192	3301	3397	3495	3597	3701	3808	3919	4032	4149	4270	4393	4521	4652	4787	4926	5068	5215	5367	5522	5682	5847		
Commerce Blvd	E Boyd Ln	1920	1920	1920	1920	1985	2053	2123	2195	2269	2347	2426	2509	2594	2682	2773	2853	2936	3021	3109	3199	3292	3387	3486	3587	3691	3798	3908	4021	4138	4258	4381	4508	4639	4774	4912		
E Boyd Ln	Brooke Park Dr	2165	2165	2165	2165	2239	2315	2393	2475	2559	2646	2736	2829	2925	3025	3127	3218	3311	3407	3506	3607	3712	3820	3931	4045	4162	4282	4407	4534	4666	4801	4941	5084	5231	5383	5539		
Brooke Park Dr	Key Dr	1915	1915	1915	1915	1980	2047	2117	2189	2263	2340	2420	2502	2587	2675	2766	2846	2929	3014	3101	3191	3284	3379	3477	3578	3681	3788	3898	4011	4127	4247	4370	4497	4627	4762	4900		
Key Dr	Davis Dr	2135	2135	2135	2135	2208	2283	2360	2441	2523	2609	2698	2790	2885	2983	3084	3173	3265	3360	3458	3558	3661	3767	3876	3989	4105	4224	4346	4472	4602	4735	4873	5014	5159	5309	5463		
Davis Dr	Big Oak Dr	2190	2190	2190	2190	2264	2341	2421	2503	2588	2677	2768	2862	2959	3059	3164	3256	3350	3447	3547	3650	3756	3865	3977	4092	4211	4333	4459	4588	4721	4858	4999	5144	5293	5447	5605		
Big Oak Dr	**Scott Road**	2170	2170	2170	2170	2244	2320	2399	2481	2565	2652	2742	2835	2932	3032	3135	3226	3319	3416	3515	3617	3722	3830	3941	4055	4172	4293	4418	4546	4678	4814	4953	5097	5245	5397	5553		
Scott Road	Weaver Cir	1850	1850	1850	1850	1913	1978	2045	2115	2187	2261	2338	2417	2500	2585	2672	2749	2829	2911	2996	3083	3172	3264	3359	3456	3556	3659	3765	3875	3987	4103	4222	4344	4470	4600	4733	0014131	6-Lanes w 20' Raised Median
Weaver Cir	Sky Mtn Ln	1900	1900	1900	1900	1965	2031	2100	2172	2246	2322	2401	2483	2567	2654	2745	2825	2907	2991	3078	3167	3259	3353	3450	3550	3653	3759	3868	3981	4096	4215	4337	4463	4592	4725	4862		
Sky Mtn Ln	Mtn Falls Way	1890	1890	1890	1890	1954	2021	2089	2160	2234	2310	2388	2470	2554	2640	2730	2809	2891	2974	3061	3149	3241	3335	3432	3531	3633	3739	3847	3959	4074	4192	4313	4438	4567	4700	4836		
Mtn Falls Way	Autumn Brook Drive	1870	1870	1870	1870	1934	1999	2067	2138	2210	2285	2363	2443	2527	2612	2701	2779	2860	2943	3028	3116	3206	3299	3395	3494	3595	3699	3806	3917	4030	4147	4267	4391	4519	4650	4784		
Autumn Brook Drive	Roper Trl	1855	1855	1855	1855	1918	1983	2051	2120	2193	2267	2344	2424	2506	2591	2680	2758	2838	2920	3005	3092	3181	3274	3369	3466	3567	3670	3777	3886	3999	4115	4234	4357	4483	4613	4747		
Roper Trl	Wheeler Martin /	1855	1855	1855	1855	1918	1983	2051	2120	2193	2267	2344	2424	2506	2591	2680	2758	2838	2920	3005	3092	3181	3274	3369	3466	3567	3670	3777	3886	3999	4115	4234	4357	4483	4613	4747		
Wheeler Martin /	Lawson Road	1815	1815	1815	1815	1877	1941	2006	2075	2145	2218	2294	2372	2452	2536	2622	2698	2776	2857	2940	3025	3113	3203	3296	3391	3490	3591	3695	3802	3912	4026	4143	4263	4386	4514	4645		
Lawson Road	Forest Creek	1815	1815	1815	1815	1877	1941	2006	2075	2145	2218	2294	2372	2452	2536	2622	2698	2776	2857	2940	3025	3113	3203	3296	3391	3490	3591	3695	3802	3912	4026	4143	4263	4386	4514	4645		
Forest Creek	Old Cumming Dr	1700	1700	1700	1700	1758	1818	1879	1943	2009	2078	2148	2221	2297	2375	2456	2527	2601	2676	2754	2833	2916	3000	3087	3177	3269	3364	3461	3561	3665	3771	3880	3993	4109	4228	4350		
Old Cumming Dr	Bagwell Lane	1670	1670	1670	1670	1727	1785	1846	1909	1974	2041	2110	2182	2256	2333	2412	2482	2554	2628	2704	2783	2863	2946	3032	3120	3210	3303	3399	3498	3599	3703	3811	3921	4035	4152	4273		
Bagwell Lane	Old Cumming Dr	1670	1670	1670	1670	1727	1785	1846	1909	1974	2041	2110	2182	2256	2333	2412	2482	2554	2628	2704	2783	2863	2946	3032	3120	3210	3303	3399	3498	3599	3703	3811	3921	4035	4152	4273		
Old Cumming Dr	Cox Court	1630	1630	1630	1630	1685	1743	1802	1863	1927	1992	2060	2130	2202	2277	2355	2423	2494	2566	2640	2717	2796	2877	2960	3046	3134	3225	3319	3415	3514	3616	3721	3829	3940	4054	4172		
Cox Court	Elementary School	1635	1635	1635	1635	1691	1748	1808	1869	1933	1998	2066	2136	2209	2284	2362	2430	2501	2574	2648	2725	2804	2885	2969	3055	3144	3235	3329	3425	3524	3627	3732	3840	3951	4066	4184		
Elementary School	Dobson Circle	1550	1550	1550	1550	1603	1657	1714	1772	1832	1894	1959	2025	2094	2165	2239	2304	2371	2439	2510	2583	2658	2735	2814	2896	2980	3066	3155	3247	3341	3438	3538	3640	3746	3854	3966		
Dobson Circle	**Union Hill Road**	1610	1610	1610	1610	1665	1721	1780	1840	1903	1968	2035	2104	2175	2249	2326	2393	2463	2534	2608	2683	2761	2841	2924	3008	3096	3186	3278	3373	3471	3571	3675	3782	3891	4004	4120		
Union Hill Road	Harmony Dr	1410	1410	1410	1410	1458	1508	1559	1612	1667	1723	1782	1842	1905	1970	2037	2096	2157	2219	2284	2350	2418	2488	2560	2635	2711	2790	2871	2954	3040	3128	3218	3312	3408	3507	3608	0014132	6-Lanes w 20' Raised Median
Harmony Dr	Charles Cobb Ln	1400	1400	1400	1400	1448	1497	1548	1600	1655	1711	1769	1829	1892	1956	2022	2081	2141	2203	2267	2333	2400	2470	2542	2615	2691	2769	2849	2932	3017	3105	3195	3287	3383	3481	3582		
Charles Cobb Ln	Jay Green Road	1405	1405	1405	1405	1453	1502	1553	1606	1661	1717	1775	1836	1898	1963	2030	2089	2149	2212	2276	2342	2410	2480	2552	2626	2702	2780	2861	2944	3029	3117	3207	3300	3396	3495	3596		
Jay Green Road	Hastey Trail	1395	1395	1395	1395	1442	1491	1542	1595	1649	1705	1763	1823	1885	1949	2015	2073	2134	2195	2259	2325	2392	2461	2533	2606	2682	2760	2840	2922	3007	3094	3184	3276	3371	3469	3569		
Hastey Trail	Shady Lane	1410	1410	1410	1410	1458	1508	1559	1612	1667	1723	1782	1842	1905	1970	2037	2096	2157	2219	2284	2350	2418	2488	2560	2635	2711	2790	2871	2954	3040	3128	3218	3312	3408	3507	3608		
Shady Lane	Eagles Nest Dr	1405	1405	1405	1405	1453	1502	1553	1606	1661	1717	1775	1836	1898	1963	2030	2089	2149	2212	2276	2342	2410	2480	2552	2626	2702	2780	2861	2944	3029	3117	3207	3300	3396	3495	3596		
Eagles Nest Dr	Benefield Road	1380	1380	1380	1380	1427	1475	1526	1577	1631	1687	1744	1803	1865	1928	1993	2051	2110	2171	2234	2299	2366	2435	2505	2578	2653	2729	2809	2890	2974	3060	3149	3240	3334	3431	3530		
Benefield Road	Johnson Brady Road	1380	1380	1380	1380	1427	1475	1526	1577	1631	1687	1744	1803	1865	1928	1993	2051	2110	2171	2234	2299	2366	2435	2505	2578	2653	2729	2809	2890	2974	3060	3149	3240	3334	3431	3530		
Johnson Brady Road	Beavers Road	1320	1320	1320	1320	1365	1411	1459	1509	1560	1613	1668	1725	1783	1844	1907	1962	2019	2078	2138	2200	2264	2329	2397	2467	2538	2612	2687	2765	2846	2928	3013	3100	3190	3283	3378		
Beavers Road	Heritage Dr	1285	1285	1285	1285	1329	1374	1421	1469	1519	1570	1624	1679	1736	1795	1856	1910	1965	2022	2081	2141	2203	2267	2333	2401	2470	2542	2616	2691	2769	2850	2932	3017	3105	3195	3288		
Heritage Dr	Jack Page Ln	1290	1290	1290	1290	1334	1379	1426	1475	1525	1577	1630	1686	1743	1802	1863	1917	1973	2030	2089	2149	2212	2276	2342	2410	2480	2551	2625	2702	2780	2861	2943	3029	3117	3207	3300		
Jack Page Ln	Watertank Road	1280	1280	1280	1280	1324	1369	1415	1463	1513	1564	1618	1673	1729	1788	1849	1903	1958	2015	2073	2133	2195	2259	2324	2392	2461	2532	2606	2681	2759	2839	2921	3006	3093	3183	3275		
Watertank Road	White City Drive	1275	1275	1275	1275	1318	1363	1410	1457	1507	1558	1611	1666	1723	1781	1842	1895	1950	2007	2065	2125	2187	2250	2315	2382	2452	2523	2596	2671	2749	2828	2910	2995	3082	3171	3263		
White City Drive	Macedonia Forest Cir	1260	1260	1260	1260	1303	1347	1393	1440	1489	1540	1592	1646	1702	1760	1820	1873	1927	1983	2040	2100	2161	2223	2288	2354	2422	2493	2565	2639	2716	2794	2876	2959	3045	3133	3224		
Macedonia Forest Cir	**E Cherokee Drive**	1255	1255	1255	1255	1298	1342	1387	1435	1483	1534	1586	1640	1696	1753	1813	1866	1920	1975	2033	2092	2152	2215	2279	2345	2413	2483	2555	2629	2705	2784	2864	2948	3033	3121	3211		
E Cherokee Drive	Kroger Entrance	1005	1005	1005	1005	1039	1075	1111	1149	1188	1228	1270	1313	1358	1404	1452	1494	1537	1582	1628	1675	1724	1774	1825	1878	1933	1989	2046	2106	2167	2229	2294	2361	2429	2500	2572	0014133	6-Lanes w 20' Raised Median
Kroger Entrance	Hampton Station Blvd	1240	1240	1240	1240	1282	1326	1371	1417	1466	1515	1567	1620	1675	1732	1791	1843	1896	1951	2008	2066	2126	2188	2251	2317	2384	2453	2524	2597	2672	2750	2830	2912	2996	3083	3173		
Hampton Station Blvd	Dock Lathem Trl	1330	1330	1330	1330	1375	1422	1470	1520	1572	1625	1681	1738	1797	1858	1921	1977	2034	2093	2154	2216	2280	2347	2415	2485	2557	2631	2707	2786	2866	2950	3035	3123	3214	3307	3403		
Dock Lathem Trl	Northwoods Dr	1340	1340	1340	1340	1386	1433	1481	1532	1584	1638	1693	1751	1810	1872	1936	1992	2050	2109	2171	2233	2298	2365	2433	2504	2577	2651	2728	2807	2889	2973	3059	3148	3239	3333	3429		
Northwoods Dr	Cotton Road	1335	1335	1335	1335	1380	1427	1476	1526	1578	1632	1687	1744	1804	1865	1928	1984	2041	2101	2162	2224	2289	2355	2423	2494	2566	2640	2717	2796	2877	2960	3046	3135	3225	3319	3415		
Cotton Road	Old Orange Mill Rd	1350	1350	1350	1350	1396	1443	1492	1543	1596	1650	1706	1764	1824	1886	1950	2007	2065	2125	2186	2250	2315	2382	2451	2522	2595	2671	2748	2828	2910	2994	3081	3170	3262	3357	3454		
Old Orange Mill Rd	Old Ball Ground Rd	1325	1325	1325	1325	1370	1417	1465	1515	1566	1619	1674	1731	1790	1851	1914	1970	2027	2085	2146	2208	2272	2338	2406	2476	2547	2621	2697	2776	2856	2939	3024	3112	3202	3295	3390		
Old Ball Ground Rd	Crystal Spring Trl	1345	1345	1345	1345	1391	1438	1487	1537	1590	1644	1700	1757	1817	1879	1943	1999	2057	2117	2178	2242	2307	2373	2442	2513	2586	2661	2738	2818	2899	2983	3070	3159	3250	3345	3442		
Crystal Spring Trl	**SR 369**	1325	1325	1325	1325	1370	1417	1465	1515	1566	1619	1674	1731	1790	1851	1914	1970	2027	2085	2146	2208	2272	2338	2406	2476	2547	2621	2697	2776	2856	2939	3024	3112	3202	3295	3390		
SR 369	Greenwood Ct	860	860	860	860	889	919	951	983	1016	1051	1087	1124	1162	1201	1242	1278	1315	1353	1392	1433	1474	1517	1561	1606	1653	1701	1750	1801	1853	1907	1962	2019	2078	2138	2200	0002862	6-Lanes w 20' Raised Median
Greenwood Ct	Old Mill Road	920	920	920	920	953	987	1023	1060	1098	1137	1178	1221	1265	1310	1358	1399	1441	1484	1528	1574	1622	1670	1720	1772	1825	1880	1936	1994	2054	2116	2179	2245	2312	2381	2453		
Old Mill Road	Arbor Hill Rd	865	865	865	865	896	928	962	996	1032	1069	1108	1148	1189	1232	1276	1314	1354	1394	1436	1479	1524	1569	1616	1665	1715	1766	1819	1874	1930	1988	2048	2109	2172	2237	2305		
Arbor Hill Rd	Orange Channel Rd	905	905	905	905	938	971	1006	1043	1080	1119	1159	1201	1244	1289	1335	1375	1416	1459	1503	1548	1594	1642	1691	1742	1794	1848	1903	1960	2019	2080	2142	2207	2273	2341	2411		
Orange Channel Rd	Trenton Lane	1105	1105	1105	1105	1145	1186	1229	1273	1319	1366	1415	1466	1519	1574	1630	1679	1729	1781	1835	1890	1946	2005	2065	2127	2191	2256	2324	2394	2466	2539	2616	2694	2775	2858	2944		
Trenton Lane	Orange Circle	1085	1085	1085	1085	1124	1165	1206	1250	1295	1341	1390	1440	1492	1545	1601	1649	1699	1749	1802	1856	1912	1969	2028	2089	2152	2216	2283	2351	2422	2494	2569	2646	2726	2807	2892		
Orange Circle	Matt Lathem Road	1070	1070	1070	1070	1109	1148	1190	1233	1277	1323	1371	1420	1471	1524	1579	1626	1675	1725	1777	1830	1885	1942	2000	2060	2122	2186	2251	2319	2388	2460	2534	2610	2688	2769	2852		
Matt Lathem Road	Standridge Road	1050	1050	1050	1050	1088	1127	1168	1210	1253	1298	1345	1393	1444	1496	1549	1595	1643	1693	1743	1796	1850	1905	1962	2021	2082	2144	2209	2275	2343	2413	2486	2560	2637	2716	2798		
Standridge Road	Smithwick Road	1050	1050	1050	1050	1088	1127	1168	1210	1253	1298	1345	1393	1444	1496	1549	1595	1643	1693	1743	1796	1850	1905	1962	2021	2082	2144	2209	2275	2343	2413	2486	2560	2637	2716	2798		
Smithwick Road	SR 372	1035	1035	1035	1035	1072	1111	1151	1192	1235	1280	1326	1373	1423	1474	1527	1573	1620	1669	1719	1770	1823	1878	1934	1992	2052	2114	2177	2242	2310	2379	2450	2524	2600	2678	2758		
SR 372	Perkins Cir	870	870	870	870	901	934	967	1002	1038	1076	1114	1155	1196	1239	1284	1323	1362	1403	1445	1489	1533	1579	1627	1675	1726	1777	1831	1886	1942	2000	2060	2122	2186	2252	2319		
Perkins Cir	Bill Bagwell Dr	1315	1315	1315	1315	1362	1411	1462	1515	1569	1626	1684	1745	1808	1873	1940	1998	2058	2120	2183	2249	2316	2386	2458	2531	2607	2685	2766	2849	2934	3022	3113	3207	3303	3402	3504		
Bill Bagwell Dr	Perkins Cir	1315	1315	1315	1315	1362	1411	1462	1515	1569	1626	1684	1745	1808	1873	1940	1998	2058	2120	2183	2249	2316	2386	2458	2531	2607	2685	2766	2849	2934	3022	3113	3207	3303	3402	3504		
Perkins Cir	Holbrook	1310	1310	1310	1310	1357	1406	1457	1509	1563	1620	1678	1738	1801	1866	1933	1991	2051	2112	2176	2241	2308	2377	2449	2522	2598	2676	2756	2839	2924	3012	3102	3195	3291	3390	3491		
Holbrook	County Line Rd	970	970	970	970	1005	1041	1079	1117	1158	1199	1242	1287	1334	1382	1431	1474	1518	1564	1611	1659	1709	1760	1813	1867	1923	1981	2040	2101	2165	2229	2296	2365	2436	2509	2585		
County Line Rd	Heardsville Road	1130	1130	1130	1130	1171	1213	1256	1302	1349	1397	1447	1500	1554	1609	1667	1717	1769	1822	1876	1933	1990	2050	2112	2175	2240	2308	2377	2448	2521	2597	2675	2755	2838	2923	3011		
Heardsville Road	Hyde Road	1105	1105	1105	1105	1145	1186	1229	1273	1319	1366	1415	1466	1519	1574	1630	1679	1729	1781	1835	1890	1946	2005	2065	2127	2191	2256	2324	2394	2466	2539	2616	2694	2775	2858	2944		
Hyde Road	Franklin Goldmine Rd	1110	1110	1110	1110	1150	1191	1234	1279	1325	1372	1422	1473	1526	1581	1638	1687	1738	1790	1844	1899	1956	2015	2075	2137	2201	2267	2335	2405	2478	2552	2629	2707	2789	2872	2958		
Franklin Goldmine Rd	Evans Road	1135	1135	1135	1135	1176	1218	1262	1307	1355	1403	1454	1506	1560	1617	1675	1725	1777	1830	1885	1942	2000	2060	2122	2185	2251	2319	2388	2460	2534	2610	2688	2769	2852	2937	3025		
Evans Road	Doc Sams Road	1250	1250	1250	1250	1295	1342	1390	1440	1492	1545	1601	1659	1718	1780	1844	1899	1956	2015	2075	2138	2202	2268	2336	2406	2478	2553	2629	2708	2789	2873	2959	3048	3139	3233	3330		
Doc Sams Road	**SR 371**	1205	1205	1205	1205	1248	1293	1340	1388	1438	1490	1543	1599	1657	1716	1778	1831	1886	1943	2001	2061	2123	2187	2252	2320	2389	2461	2535	2611	2689	2770	2853	2939	3027	3118	3211		
SR 371	Era Drive	985	985	985	985	1020	1057	1095	1135	1176	1218	1262	1307	1354	1403	1453	1497	1541	1588	1635	1684	1735	1787	1841	1896	1953	2011	2072	2134	2198	2264	2332	2402	2474	2548	2624	0003682	6-Lanes w 20' Raised Median
Era Drive	Era Drive	1495	1495	1495	1495	1549	1605	1662	1722	1784	1848	1915	1984	2055	2129	2206	2277	2349	2425	2502	2582	2665	2750	2838	2929	3023	3119	3219	3322	3429	3538	3652	3768	3889	4013	4142		
Era Drive	Lakeside Lane	1495	1495	1495	1495	1549	1605	1662	1722	1784	1848	1915	1984	2055	2129	2206	2277	2349	2425	2502	2582	2665	2750	2838	2929	3023	3119	3219	3322	3429	3538	3652	3768	3889	4013	4142		
Lakeside Lane	Aaron Sosebee Rd	1480	1480	1480	1480	1533	1588	1646	1705	1766	1830	1896	1964	2035	2108	2184	2254	2326	2400	2477	2557	2638	2723	2810	2900	2993	3088	3187	3289	3394	3503	3615	3731	3850	3973	4101		
Aaron Sosebee Rd	Chamblee Gap Rd	1435	1435	1435	1435	1487	1540	1596	1653	1713	1774	1838	1904	1973	2044	2117	2185	2255	2327	2401	2478	2557	2639	2724	2811	2901	2994	3089	3188	3290	3396	3504	3616	3732	3852	3975		
Chamblee Gap Rd	Business Dr	1460	1460	1460	1460	1513	1567	1623	1682	1742	1805	1870	1937	2007	2079	2154	2223	2294	2367	2443	2521	2602	2685	2771	2860	2951	3046	3143	3244	3348	3455	3566	3680	3797	3919	4044		
Business Dr	Business Dr	1470	1470	1470	1470	1523	1578	1635	1693	1754	1818	1883	1951	2021	2094	2169	2238	2310	2384	2460	2539	2620	2704	2791	2880	2972	3067	3165	3267	3371	3479	3590	3705	3824	3946	4072		
Business Dr	Jake Dr	1495	1495	1495	1495	1549	1605	1662	1722	1784	1848	1915	1984	2055	2129	2206	2277	2349	2425	2502	2582	2665	2750	2838	2929	3023	3119	3219	3322	3429	3538	3652	3768	3889	4013	4142		
Jake Dr	Bethelview Road	1535	1535	1535	1535	1590	1648	1707	1768	1832	1898	1966	2037	2110	2186	2265	2337	2412	2489	2569	2651	2736	2824	2914	3007	3104	3203	3305	3411	3520	3633	3749	3869	3993	4121	4253		
Bethelview Road	Woodland Hills Drive	1190	1190	1190	1190	1233	1277	1323	1371	1420	1471	1524	1579	1636	1695	1756	1812	1870	1930	1992	2056	2121	2189	2259	2332	2406	2483	2563	2645	2729	2817	2907	3000	3096	3195	3297		
Woodland Hills Drive	Carla Drive	1625	1625	1625	1625	1684	1744	1807	1872	1939	2009	2081	2156	2234	2314	2398	2475	2554	2636	2720	2807	2897	2990	3085	3184	3286	3391	3499	3611	3727	3846	3969	4096	4228	4363	4502		
Carla Drive	Sunrise Circle	1695	1695	1695	1695	1756	1819	1885	1953	2023	2096	2171	2249	2330	2414	2501	2581	2664	2749	2837	2928	3021	3118	3218	3321	3427	3537	3650	3767	3887	4012	4140	4272	4409	4550	4696		
Sunrise Circle	Friendship Circle	1685	1685	1685	1685	1746	1809	1874	1941	2011	2083	2158	2236	2317	2400	2486	2566	2648	2732	2820	2910	3003	3099	3198	3301	3406	3515	3628	3744	3864	3987	4115	4247	4383	4523	4668		
Friendship Circle	Sawnee Elementary	1695	1695	1695	1695	1756	1819	1885	1953	2023	2096	2171	2249	2330	2414	2501	2581	2664	2749	2837	2928	3021	3118	3218	3321	3427	3537	3650	3767	3887	4012	4140	4272	4409	4550	4696		
Sawnee Elementary	Spot Road Conn	1870	1870	1870	1870	1937	2007	2079	2154	2232	2312	2395	2482	2571	2663	2759	2847	2938	3032	3129	3230	3333	3440	3550	3663	3780	3901	4026	4155	4288	4425	4567	4713	4864	5020	5180		
Spot Road Conn	Mtn Valley Cir	1505	1505	1505	1505	1559	1615	1673	1734	1796	1861	1928	1997	2069	2144	2221	2292	2365	2441	2519	2600	2683	2769	2857	2949	3043	3141	3241	3345	3452	3562	3676	3794	3915	4041	4170		
Mtn Valley Cir	Dr Bramblett Road	1545	1545	1545	1545	1601	1658	1718	1780	1844	1910	1979	2050	2124	2201	2280	2353	2428	2506	2586	2669	2754	2842	2933	3027	3124	3224	3327	3434	3544	3657	3774	3895	4019	4148	4281		
Dr Bramblett Road	Smithdale Road	1515	1515	1515	1515	1570	1626	1685	1745	1808	1873	1941	2010	2083	2158	2235	2307	2380	2456	2535	2616	2700	2786	2876	2968	3062	3160	3262	3366	3474	3585	3700	3818	3940	4066	4196		
Smithdale Road	Crestbrook Drive	2090	2090	2090	2090	2165	2243	2324	2408	2494	2584	2677	2773	2873	2977	3084	3183	3285	3390	3498	3610	3726	3845	3968	4095	4226	4361	4501	4645	4793	4947	5105	5268	5437	5611	5790		
Crestbrook Drive	Tower Road	2080	2080	2080	2080	2155	2232	2313	2396	2482	2572	2664	2760	2860	2963	3069	3167	3269	3373	3481	3592	3707	3826	3949	4075	4205	4340	4479	4622	4770	4923	5080	5243	5410	5584	5762		
Tower Road	Sawnee Drive	2175	2175	2175	2175	2253	2334	2418	2506	2596	2689	2786	2886	2990	3098	3209	3312	3418	3527	3640	3756	3877	4001	4129	4261	4397	4538	4683	4833	4988	5147	5312	5482	5657	5838	6025		
Sawnee Drive	**N Corners Pkwy**	1835	1835	1835	1835	1901	1969	2040	2114	2190	2269	2350	2435	2523	2614	2708	2795	2884	2976	3072	3170	3271	3376	3484	3596	3711	3829	3952	4078	4209	4344	4483	4626	4774	4927	5084		
N Corners Pkwy	Health Dr	1880	1880	1880	1880	1948	2018	2090	2166	2244	2324	2408	2495	2585	2678	2774	2863	2954	3049	3146	3247	3351	3458	3569	3683	3801	3923	4048	4178	4311	4449	4592	4739	4890	5047	5208		
Health Dr	Pine Lake Drive	1970	1970	1970	1970	2041	2114	2191	2269	2351	2436	2523	2614	2708	2806	2907	3000	3096	3195	3297	3403	3512	3624	3740	3860	3983	4111	4242	4378	4518	4663	4812	4966	5125	5289	5458		

Peak Hour Directional, Transitioning Areas, State Signalized Arterials, Class I (40 mph or higher posted speed limits), LOS D Criteria

1460 - 4 Lanes Needed

3200 - 6 Lanes Needed

4820 - 8 Lanes Needed

Growth Rates:

	I-575 to SR 369	SR 369 to SR 371	SR 371 to Cumming
2014-2025	**3.4%** 2014-2025 Growth Rate (I-575 to SR 369)	**3.6%** 2014-2025 Growth Rate (SR 369 to SR 371)	**3.6%** 2014-2025 Growth Rate (SR 371 to SR 400)
2025-2045	**2.9%** 2025-2045 Growth Rate (I-575 to SR 369)	**3.0%** 2025-2045 Growth Rate (SR 369 to SR 371)	**3.2%** 2025-2045 Growth Rate (SR 371 to SR 400)

AECOM
1360 Peachtree Street NE,
One Midtown Plaza, Suite 500
Atlanta, GA 30309
www.aecom.com

404 965 9600 tel
404 965 9605 fax

SR 20 Improvements from Canton to Cumming
PI No's: 0014131, 0014132, 0014133, 0002862, 0003682

AECOM Proj.: 60507210 (File 60267130)

Meeting Minutes

Subject: Discussion with OPD on preliminary VE Study Recommendations

Date: March 3, 2017, 9:30 am

Location: GDOT 25th floor, OPC Conf Rm

Invitees: GDOT: Nicole Law (PM), Albert Shelby (State Program Delivery Administrator)
Project Team: Scott Gero (PM), Lindsey Dunahoo (Lead Eng), Paola Rojas (Eng)

Review of the Draft VE Study Recommendations - The VE Study was completed this week. Today's meeting is for the project team to go over the preliminary recommendations with the Office of Program Delivery to determine draft responses and direction forward on the various recommendations.

1.0 – Reduce from 6 to 4 lanes from Union Hill Rd to SR 371 (PI #'s 0014132, 0014133, 0002862) – No, we do not agree with implementing this recommendation. GDOT upper management has determined that the design will proceed with 6 lanes.

2.0 – Reduce lane widths from 12-feet-wide to 11-feet-wide – We agree that reducing the design to 11 foot lanes will reduce impacts to adjacent resources and will still provide an adequate facility for vehicular flow however, we only agree to a portion of this recommendation. See the next issue and response.

2.1 – Reduce inner 2 lane widths each direction from 12-feet-wide to 11-feet-wide (outside lane width each direction remains 12 ft). We agree to implement this recommendation. We feel that the outside lane should provide the full 12 ft lane width to accommodate tractor trailers on this truck route. The reduction in lane width of the two inner travel lanes will help reduce:

- The footprint and impacts to the adjacent parcels and resources
- The amount of runoff that needs to be treated and detained to meet MS4 and Drainage Design Policies.
- The distance pedestrians have to cross at intersections and therefore reducing the phases necessary for this movement.
- The cost through savings in materials needed for construction and maintenance of the roadway.

3.0 – Reduce median with from 20 ft to 16 ft – No, we do not agree with implementing this recommendation. The project proposes to provide a 6-lane section (3-lanes in each direction). GDOT Policy states that full median breaks are not allowed at side roads or access points unless there is a signal warranted and installed. Due to the 6-lane section, Restricted Crossing U-Turns (R-Cuts) will be installed to manage access and limit to one-way operation through the median. The design of the R-Cuts require that positive median separation (a raised median) be provided to manage traffic and discourage wrong way use of the opening. Although the VE Study team has developed a sketch of a way to provide a reduced section in the 16 ft median which consists of an 11 ft turn lane and back to back curb and gutter to provide a positive median separation, studies of other projects using similar raised median width reductions have found negative consequences with this reduced design width. Negative issues identified include:

- Reduced visibility of narrow raised median incurring impacts due to vehicles not observing and therefore not yielding to their intended prevention of crossing.
- Reduced width not an obviously large enough median width to deter those who recognize the obstruction but not finding it intimidating enough to prevent their crossing it anyways.

In addition, the project team prefers the full 20 ft median to provide enough green space to provide some landscaping to soften the affect of the ultimate facility of 6-lanes of traffic. There has been some public

objection to the 6 lanes vs 4 lanes section and the large expanse of pavement proposed. The 20 ft median will provide a larger green space in the middle to break up the expanse of asphalt and hopefully be more aesthetically pleasing and sensitive to the communities in which this project resides.
The project team therefore disagrees with the recommendation and prefers to continue with the 20 ft raised median to better manage traffic flow, provide a safer more visible channelizing barrier, and to provide a more aesthetically pleasing final product.

4.0 – Construct rural shoulder with 10-foot-wide overall shoulder with 4-foot-wide partial depth pavement.
No, we do not agree with implementing this recommendation. The project resides within an MS4 region and therefore is subject to post construction stormwater management as well as the requirements of the Drainage Design Policy Manual with a post-developed flow increase. Post construction stormwater management requirements include stormwater runoff quality/reduction, stream channel protection, and overbank flood protection. In order to satisfy these requirements we intend to capture all of the runoff of the pavement through use of curb and gutter (an urban shoulder) into a separate closed drainage system which will pipe the roadway runoff to a permanent post construction stormwater detention basin. This permanent BMP will provide water treatment and detention before releasing downstream to a water of the US. Additionally the point outfalls will be limited therefore reducing the number of required BMPs.
Utilizing a rural shoulder may allow sheet flow for treatment of water quality but this technique would not provide the necessary detention requirements to satisfy the post construction flow increases.

4.1 - Construct 12-foot-wide urban shoulder in lieu of 16-foot-wide urban shoulder. The project team agrees to partially apply this recommendation. In areas where a 16 ft shoulder can fit without significant impact to adjacent resources, we recommend keeping the 16 ft shoulder. This provides additional buffer between pedestrians on the sideway and the through traffic. This also provides more area for utility relocations to fit combined with other roadside elements. In areas where a reduction to a 12 ft shoulder width would avoid or minimize adverse impacts to adjacent resources, this reduced width shoulder would be employed.

7.0 – Eliminate ponds at five displacements The project team is evaluating the requirements of MS4 and the management of runoff to conform with the MS4 Permit as well as the drainage manual. The team is evaluating the design of BMP's to address both with every intent to minimize impacts and displacements. The project team feels this recommendation is shortsighted in that it only addresses consideration of MS4. The Drainage Design for Highays manual section 10.2.1.1 requires that the added runoff from a project that adds impervious surfaces does not adversely affect downstream for the 25 year storm. This additional requirement of the design team essentially encompasses or trumps the MS4 BMP infeasibility requirements. MS4 allows a method of evaluation and consideration whereby cost and/or impacts can render a need to meet MS4 requirements infeasible thereby eliminating this BMP. However, we are still obligated by the drainage manual to address the detention of additional runoff and therefore are still obligated to provide measures to satisfy this detention. For this project, the detention is being addressed with detention ponds and therefore they cannot be eliminated even to avoid a displacement although a avoiding displacements is the first choice in locating a pond.

10.0 – Perform detailed MS4 calculations to allow for elimination of ponds; acquire non-pond parcels first
This project has an extremely accelerated schedule with R/W Authorization scheduled for FY 17 for this 18.8 mile long project. The magnitude of the effort required to perform detailed MS4 calculations to allow for elimination of ponds is not feasible to meet this accelerated schedule. The project team philosophy and approach to simplify and streamline the design process to establish conservative construction limits and subsequent Required R/W and Easements is as follows:

- Capture all runoff on SR 20 utilizing curb and gutter and a separate drainage system to pipe runoff from the roadway to detention ponds.
- Dry Detention Ponds are one of the possible MS4 BMP's for treating the water quality of the runoff as well as for detaining the water quantity of runoff. This dry pond BMP can treat 65% of

the TSS in the runoff. The MS4 permit requires that 80% of the TSS be removed from the runoff of newly added pavement. The weighted average of 65% of treatment by the pond of all the pavement runoff will for the majority of the drainage areas be equivalent to or exceed the 80% requirement of treatment of the additional pavement. The dry detention pond will in the majority of the drainage areas satisfy the water quality requirement of the MS4 permit and therefore eliminate lengthy and detailed analysis of multiple BMP alternatives or BMP trains. This in turn will save design time and get us to R/W Authorization sooner.

- The dry detention ponds will be initially sized to detain the volume of water from the 25 year storm event. When combined with the ability to achieve the TSS removal objective, these ponds will now satisfy both water quality and water quantity objectives as well as prevent downstream flooding to satisfy the downstream hydrologic assessment required by the drainage manual.
- This initial pond sizing will establish the conservative Required R/W and Easements to construct the pond including access roads for future maintenance. Now the team can prepare the Right of Way Plans to acquire the conservative project limits.
- Once the ponds have been sized, the drainage engineers will further detail evaluate whether the pond sizes can be reduced by:
    - Analyzing to see if allowing the new runoff to bypass the need for detention to pass the downstream hydrologic assessment without creating a downstream flooding situation. If so, the pond can then be secondarily analyzed and considered for whether or not it can be determined infeasible by means in accordance with the MS4 design process or if it can be replaced by other BMPs that would have smaller footprints and therefore require less R/W.
    - Analyzing the pre-development runoff flows and designing this flow rate into the detention pond outflow control structure along with the flow and outfall design necessary to successfully treat the removal of TSS (water quality) and then reducing this continuous flow across the design year storm duration from the overall pond size. This essentially optimizes the pond size down from its original conservative pond size developed in the earlier steps.

The design team agrees that the R/W acquisition team should begin acquiring parcels without the detention ponds or BMP's first allowing more time for the design team to conclude if detention ponds can be eliminated or reduced in size and then revise the Right of Way Plans with the savings prior to approaching the property owner for acquisition.

12.0 – Use consistent Right-of-Way width with permanent easements beyond. No, we do not agree with implementing this recommendation until further discussion and research can be completed. The project team plans to discuss with the District R/W Agents whether or not it makes sense to purchase all needed property as R/W or whether minimizing R/W and utilizing easements for construction of slopes would be appropriate for this corridor. Often times in rural areas, property owners have no desire to hang onto lands with an easement for a roadway slope when they can't find it to be useable for anything. In these cases they would prefer all needs to be required R/W and tie in slopes to be steeper. Typically in urban environments, placing the Required R/W at the should break minimizes impacts to adjacent parcels as these property owners would rather keep the slopes tying to existing as flatter slopes and useful as yards or other useful aspects of their property even though they may be permanent or even temporary easements. The project team will reach out to the District 1 and Distric 6 R/W agents for guidance and adjust accordingly.

17.0 – Use Design/Build as project delivery method to meet expedited schedule. No, we do not agree with implementing this recommendation. We have not seen conclusive evidence that the Design/Build project delivery method provides costs savings over traditional design bid build. We recognize that time savings could be realized through this method but not necessarily, cost savings.

Schedule – Albert said to add into our schedule time to present the design and R/W needs following the PFPR and before presenting to the public at the next round of PIOH's.

PIOH Displays – Albert agreed that proposed signals should be shown on PIOH displays even if they have not been approved as TE Studies through the District Traffic Engineers. All recognized that failing to show likely signals is confusing to the public and just creates further angst. Albert said to make sure to add a label such as "Pending approval of a TE Study" or similar.

45 mph vs 55 mph: Scott recommended that the project be designed to 45 mph to prevent the additional need for a paved 10 ft outside shoulder and 2' paved inside shoulder for speeds over 45 mph. This will save on footprint, an obvious concern by the public who is pushing back on the need for 6 lanes. It will also save on runoff for detention pond sizing and cleanzing of pollutants. It will also save on overall construction and R/W costs by minimizing the footprint size. Albert said the best way to handle this would be to write an escalation memo for the Chief Engineer to request design to 55 mph with a variance from the need for the additional shoulder offset widths to the raised medians. Scott explained that currently all of SR 20 in Cherokee County and the first part into Forsyth County is currently posted as 45 mph. It then increases to 55 mph and drops back down to 50 mph just east of Sr 371/Post Rd to the end at N Corners Pkwy. Albert said to include a graphic depicting this in the escalation memo as it will help with the issue.

Attachment 9

Meeting Minutes (Other)

AECOM
1360 Peachtree Street NE,
One Midtown Plaza, Suite 500
Atlanta, GA 30309
www.aecom.com

404 965 9600 tel
404 965 9605 fax

SR 20 Improvements from Canton to Cumming
Project No's: STP00-0002-00(862),
STP00-0003-00(681), STP00-0003-00(682)
PI No's: 0002862, 0003681, 0003682

AECOM Proj.: 60267130

Meeting Minutes

Subject: Initial Concept Team Meetings for the SR 20 Corridor Improvements

Date: 2:00 pm March 5, 2013 at the GDOT District 1 Office (Gainesville)
10:00 am March 6, 2013 at the GDOT District 6 Office (Cartersville)

Attendees: see attached sign-in sheets

The meeting began with a round of introductions for everyone in attendance.

Karyn Matthews, GDOT PM, welcomed everyone and asked that they all participate and provide input as the project is presented throughout the meeting. She then introduced Scott Gero as the consultant Project Manager.

Scott Gero, Karyn Matthews, Claudia Bilotto (NEPA Lead), Don Gaines (traffic engineer), Leah Vaughan (Public Involvement lead), and Matt Scofield (Public Relations lead) went through a power point presentation that presented the project. See attached. The power point presentation touched on the following topics:

- Project location – SR 20 from I-575 to SR 400 in Cherokee and Forsyth counties
- History of projects – formerly 3 independent EA's => reissued as one EIS
- Schedule – 6 years to get to a ROD plus 2-3 more to get to letting.
- Project framework and approach
- Approach to public involvement
- Outreach to date –
    - Listening Tour – mtgs with city/county engineers and leaders, chambers of commerce, newspapers (Cherokee Tribune, Forsyth County News) – went over key takeaways from these meetings
    - Water Tank Rd Neighborhood Watch meeting – met with homeowners at their requeset to describe the project and process
- Metro Quest – the beta version of this new to GDOT software and website was presented for SR 20. It provides another tool for reaching out and gathering input. The screens include:
    - Welcome screen – general location and description of project and process
    - Priorities screen – allows user to prioritize their top 5 issues for the corridor
    - Show Us screen – interactive map that allows user to drop icons on map and enhance the icon's with information (ex. Work Icon – drop on location and enhance with travel mode and frequency)
    - Survey screen – further asks questions to understand the perspective of the user
    - Stay Involved screen – opportunity to provide additional demographic information including contact info, as well as provides links to project website, GDOT, & FHWA.
- Key messages for all when interacting with any agencies or public
- Project Justification Statement
- Draft Need and Purpose (final to be developed during the "Scoping" phase)
- Functional Classification – mix of Urban and Rural Principal Arterials
- Maps showing LOS 2010 and 2040

    - **Action** – verify that the 2040 LOS no-build projections takes into account the passing lane project currently under construction in Cherokee County.
- High crash areas map – crash data collected from CARE for 2007-2009 (the most recent available data), considers 5 or more crashes per year to be a high crash location
- Planned and programmed projects on a map showing:
    - Programmed
    - Long Range
    - Aspirations
- Explanation of the "Scoping" process as required by an EIS
- Initial thoughts on design considerations
- Request of known maintenance issues – none provided
- Utilities – SUE will be used on the project. There was a call for any special utility issues.
    - GA Transmission (March 6 mtg) mentioned they have a proposed crossing. Locations were provided through Karyn Matthews by email on 2/7/13. There is an existing GTC line in Canton that is perpendicular to the corridor and there are some nearby facilities in Cumming though it is believed that they have been moved as a result of other projects. It should be fairly clean – they will double check.
    - AT&T mentioned that they have some facilities and would provide to our SUE (TBE Group). This includes 12 pair duct banks along SR 20, closer to Cumming, and includes locations under existing pavement.

Scott stressed that this project is currently seeking ways to "improve" SR 20. The scoping process will bare out whether or not the project becomes a widening project. At this point in the EIS and project development, the key message is that we are seeking ways to improve SR 20 so that we can safely and efficiently move people and goods through the corridor.

Notes from the District 1 meeting:

Teri Pope asked if the SR 20 project currently under construction were included on the project website. The team responded that all of the SR 20 projects have been consolidated onto one main page at www.dot.ga.gov/sr20improvements. From that page, you can follow a link to specific project information.

The City of Cumming commented "The sooner the better".

A representative mentioned that GTC was purchasing Right of Way now along the entire corridor for a new line between Canton and Cumming.

Neil Cantner asked if there are any specific areas where issues were worse than another. The team responded that each end of the corridor – the Canton and Cumming areas within the city limits and tie ins to GA 400 and I-575 – were anticipated to be the most complex.

Someone asked the duration of the project (8-10 years) and how many projects were included (three). Another attendee asked if staging would be discussed in this phase of the project. Scott responded that it would occur later as the alternatives are developed and most likely at the Concept Team Meeting.

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Notes from the District 6 meeting:

Mike Haithcock (Dist 6 Asst Dist Engineer) commented that they have received some funding for some quick turnaround projects that were less than $200K. The district has identified 7 or 8 projects to date that were located within right of way limits and did not involve utility relocations. Examples of these projects include right or left turn lanes or signals. He asked that as the project team evaluates the corridor, that if they see any potential small projects that would provide immediate benefit and fit the criteria, that they bring these to the attention of District 6. District 6 would then further evaluate to see if the projects fit into their funding and improvement plan. This should take place over the next 6 months.

Keith Posey (?) asked how the website will be publicized? The team responded that the GDOT project website address would be included on all project materials including flyers, webcards, press releases, and signage and would also be promoted through social media outlets including Facebook and Twitter. The MetroQuest website will be directly linked to the GDOT project website.

Mike Haithcock commented that distrust in Government is a general problem in the districts. He has found that making an effort to send GDOT staff to standing meetings in response to requests goes a long way. He offered the district's assistance in doing this throughout the course of the project.

Mike Haithcock commented that if there are solutions or projects that will potentially look at access control, the district could go in and buy access rights in advance.

Other notes:
Need to add proposed partk at Water Tank Road to the Concept Layout.

Cynthia Burney provided information regarding Safety Projects along SR 20 and SR 140 – limits for the project are the western and eastern Cherokee County boundaries. These improvements include surface treatments, guardrail, and additional signage in some locations – all low cost improvements. The project is anticipated to let in December.

AECOM
1360 Peachtree Street NE,
One Midtown Plaza, Suite 500
Atlanta, GA 30309
www.aecom.com

404 965 9600 tel
404 965 9605 fax

SR 20 Improvements from Canton to Cumming
PI No's: 0014131, 0014132, 0014133, 0002862, 0003682

Meeting Minutes

AECOM Proj.: 60507210 (File 60267130)

Subject: Design issues

Date: September 21, 2016, 10:00 am

Location: GDOT OPC Conf Rm (25th floor)

Attendees:

Hiral Patel	GDOT Director of Engineering
Brent Story	GDOT Design Policy & Support
Dan Pass	GDOT Design Policy & Support
Albert Shelby	GDOT Program Delivery Engineer
Nicole Law	GDOT PM
Scott Gero	AECOM PM
Lindsey Dunnahoo	AECOM Engineer
Jeff Wood	AECOM Traffic Engineer
Laura Dawood	AECOM Environment Lead

- **Proposed Laneage & Cost** –
  - Traffic data analyzed and projected out to Design Year 2045 to determine laneage needs (See attachment)
  - AECOM recommended 6 through lanes from Scott Rd to SR 369 and then from SR 371 to N. Corners Pkwy (project end on the west side of Cumming). A 4-lane section is recommended in the middle from SR 369 to SR 371.
  - The 6-lane (w 4-lane for PI 0002862) has a concept cost of $315 MM. The 4-lane has a concept cost of $270 MM. GDOT acknowledged that the relatively minor difference in cost was worth pursuing the 6-lane option since it meets the design year demand.
  - The concept should include carrying 6-lanes the entire way so that it won't need to be revisited for future expansion later. This will be the preferred approach for now and what we should take to the public for comment. If there are concerns raised through the public involvement effort, then those areas would be reconsidered at that time. (Following the meeting it was determined that this approach will be presented to the Chief Engineer through an escalation memo to confirm.)
- **Access Control** –
  - GDOT directed AECOM to design for Permitted Access and allow the District to determine which driveway access will be approved in the future. It would be too difficult for this corridor with the many existing driveways and access points to try to switch it to Partial Control of Access at this time. AECOM should try to combine driveways and pull back driveways from the functional area of intersections where feasible.
  - The topography drops off to both the north and south sides in many locations which limits the adjacent network of roads. Many of the side roads, especially to the north of SR 20 tie directly to SR 20 and do not have a connecting parallel route. Therefore, many of the side roads need to have continued access to SR 20 as there are no other alternatives.
- Other Design Issues:

- The design speed should match the existing posted speeds. Alternative speed designs can be considered later in the design process if needed.
- Signals are determined based on warrant analysis
- AECOM proposed utilizing RCUT intersection control in lieu of additional signals to manage access. The context of the adjacent access will determine if the RCUT will be designed to accommodate passenger cars (can occur within the 6-lane and median footprint) or if it needs to accommodate tractor trailers (additional eyebrow paving needed for turning movement of large vehicles). RCUT median breaks to accommodate tractor trailers would be spaced at a logical distance and signed so that truck drivers would know not to try to U-turn in a passenger car only median break. GDOT agreed that this is a good approach to this corridor. It will improve safety and reduce friction points for the through movement providing better throughput and reduced travel times.
- The roundabouts would need to be peer reviewed. GDOT has considered 2 lane roundabouts, but 3 lanes is out of the norm to date. Consider 3 approach lanes tapering to 2 lane roundabout.
- Since this is state funded, consider assessing non-AASHTO standard situations and evaluating needs to improve sub-standard existing conditions on a case by case basis, and use data (e.g., crash) to support decision-making. For example, improving sags has not been a requirement even for FHWA projects.
- Other techniques for access control should be applied where feasible:
    - Consolidation of side roads and driveways
    - Elimination of dual driveways for parcels that can function with one, recommend design in this way and if there are concerns during R/W acquisition, then design can be revisited on a case by case basis.
    - Acquisition of access rights from adjacent properties where feasible
- Median widths:
    - 20’ raised (45 mph)
    - 24’ raised (>45 mph) – provides a 2’ buffer from the Type 7 curb of the raised median
    - 32’ depressed (55 mph 4-lane) – decided not to use but rather to move forward with a 6-lane and 20’ or 24’ raised median
    - 44’ depressed – if a 6-lane will not work in portions of PI 0002862 due to excessive impacts, then it may be best to provide a 4-lane with a 44’ depressed median for portions that can accommodate this width and which can be expanded to a 6-lane in the future. The constrained areas would be a 4-lane with a reduced raised median and in the future if 6-lanes are needed, these areas of high impacts would have to be re-evaluated and addressed at that time. This scenario would only be considered if it is found that a 6-lane section would have unacceptable impacts if constructed now.
    - Median widths can be reduced in certain areas if we get pushback from the public.
- Shoulders:

        - Brent instructed AECOM that it is acceptable to utilize a rural shoulder on one side of the road opposite of an urban shoulder if it fits into the context of the area. AECOM agreed and recommended a rural shoulder where possible to assist with water quality and MS4 design. It is more difficult to meet MS4 with a curb and gutter/closed drainage design than with rural shoulders. Brent Story agreed.
        - Shoulder widths can be reduced in certain areas if we get pushback from the public.
    - Public Involvement:
        - Based on the decisions today, AECOM will revise the layout and can then schedule meetings with local elected officials.
        - The project team should inform the District Engineers (Comer (Dist 6), Cook (Dist 1)) of any meetings and extend the offer for their attendance if available.
        - Elected state representatives can be informed through a letter and referral to displays on the website. This should be done in advance of the PIOH meeting dates.
        - Once the design is revised, a set of PIOHs (2 nights, 1 on east end and 1 on west end) can be scheduled and conducted. Anticipate not needing as much educational materials as at previous PIOHs. The displays should include:
            - Renderings/simulations (e.g., where the new road paints over the existing roadway and takes the viewer on a drive of the corridor)
            - Roll plots
            - Educational materials for RCUTs (Tyler Peak at D3 may have some good resources.)
        - The project team should anticipate that public input may affect the concept layout.
    - Environment
        - Prior to going to PFPR, there needs to be a comfort level that resources have been identified and effects determinations are not going to change (e.g. from adverse to significantly adverse under GEPA).
        - Do not necessarily need an approved GEPA document

Displays/Handouts:

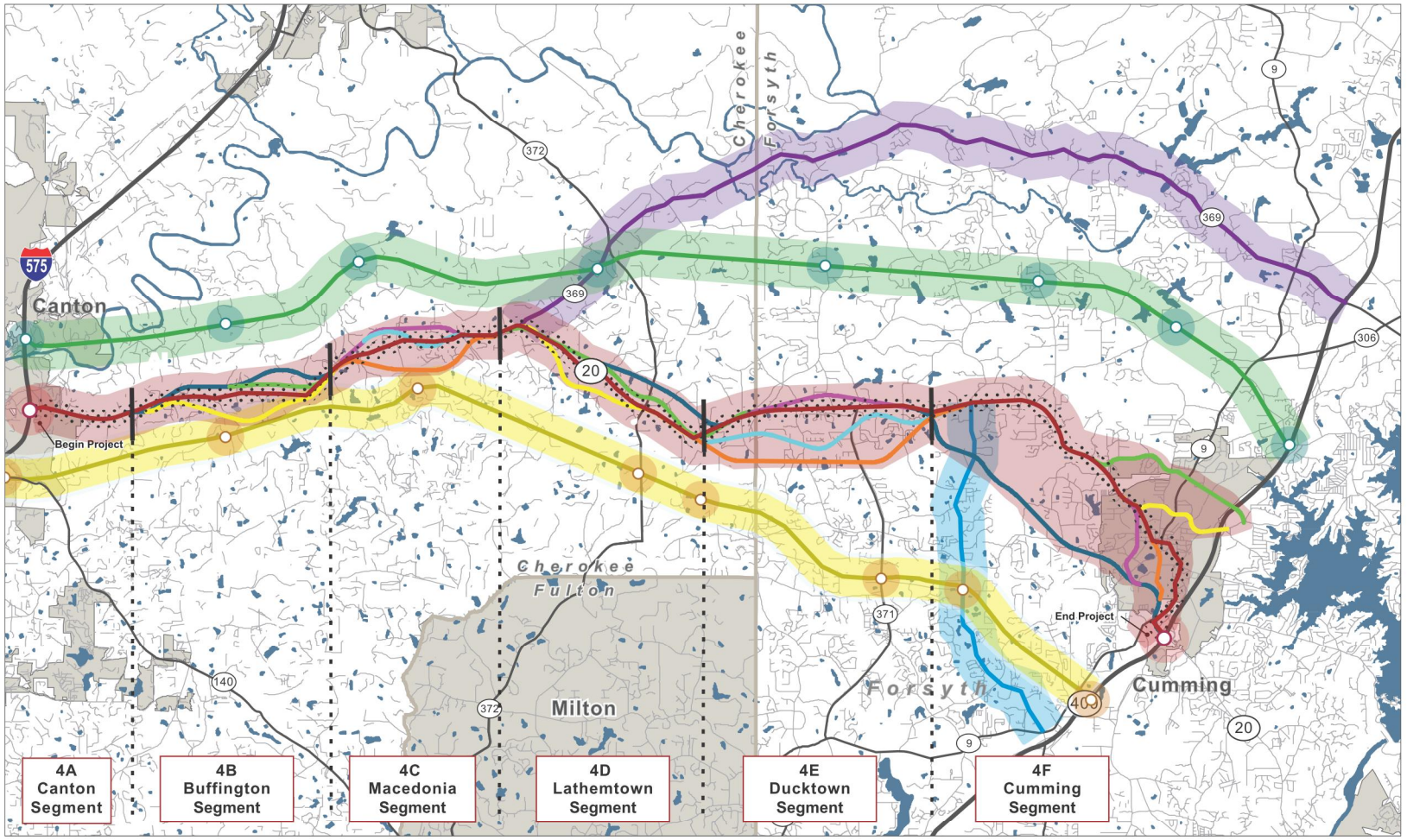
- Roll plots of 6-lane w signal and RCUT locations as well as edge of pavement for 4-lane scenario
- Handout: Corridor Map w/ PI Delineations & Laneage Requirements, Laneage Needs Spreadsheet, Typical Sections

Brief Project Description		SR 20 Improvements from Scott Road to N. Corners Parkway (PIs 0014131, 0014132, 0014133, 0002862, 0003682)					
Date of Open House		12-6-2016		*End of Comment Period*	12-30-2016		
Number in Attendance		312					
Officials in Attendance (list name and title)		Scott Morgan, Representing City of Cumming Paul Oh, Representing Congressman Rob Woodall Media Present: Forsyth Herald, Forsyth County News					
Comment Breakdown (for comments provided at the Open House) 6 total written comments received.							
For	17	*Conditional*	10	*Uncommitted*	2 (plus 2 who didn't answer)	*Against*	2
Major concerns:		In general, the project received support. The following were concerns voiced at the meeting: -Access and/or impacts to personal property and businesses, -Increased truck traffic, -Questions about benefits of restricted U-turn design, -Questions about why the project ends west of Cumming and does not continue to SR 400, -Design suggestions for specific locations, - Questions about what makes a property historic					
Prepared by (include firm's name if applicable):		Leah Vaughan, Sycamore Consulting, Inc.					

Brief Project Description		SR 20 Improvements from Scott Road to N. Corners Parkway (PIs 0014131, 0014132, 0014133, 0002862, 0003682)					
Date of Open House		12-15-2016		*End of Comment Period*		12-30-2016	
513		312					
Officials in Attendance (list name and title)		State Representative Wes Cantrell Beatrice Torralba, Representing Senator David Perdue Geoff Morton, Cherokee County Media Present: Cherokee Tribune					
Comment Breakdown (for comments provided at the Open House) 6 total written comments received.							
For	8	*Conditional*	15	*Uncommitted*	3 (plus 1who didn't answer)	*Against*	1
Major concerns:		Anecdotally, the project received wide-spread support. The reporter from the Cherokee paper noted that he had never seen as many happy people at a PIOH. Of the written comments received, there were several major categories of concern: • Access and/or impacts to personal property and businesses, specifically related to the addition of a median/RCUTS; • Questions about benefits of the median and restricted U-turn design; • Concern about fair and speedy relocation/compensation for displacement properties and/or a desired for complete taking rather than having the road too close to homes; • Impact of increased noise and pollution; • Requests for traffic signals; • Tractor trailer traffic access to industrial park, other businesses where U-turns will be difficult. • Design suggestions for specific locations; and • Appreciation for the design and process.					
Prepared by (include firm's name if applicable):		Leah Vaughan, Sycamore Consulting, Inc.					

Attachment 10

Screen 2 Conceptual Alternatives



Legend

- Conceptual Alternative 2 Widen Existing (formerly Alt-B)
- Conceptual Alternative 3A New Location North (formerly Alt-A)
- Conceptual Alternative 3B New Location South (formerly Alt-C)
- Conceptual Alternatives 4 Combination Alt 2 and Localized Bypasses (formerly Alt-B)
- Conceptual Alternative 5A Combination of Alt 4 to SR 369; cosign SR 369 as SR 20
- Conceptual Alternative 5B Combination of Alt 4 to Bethelview Road; cosign Bethelview Road as SR 20

Note: Conceptual Alternative 0 - No Build and Conceptual Alternative 1 - Transportation Systems Management are not shown on the map.

SR20 IMPROVEMENTS CANTON TO CUMMING

Conceptual Alternatives Map

0 1 2 Miles North

GDOT Georgia Department of Transportation

21.0 DISPLACEMENTS

Displacements presented in the table below distinguish between total displacements of a conceptual alternative and displacements per mile. Each table is formatted so that the Total column indicates both the total displacements and the rate of displacements per mile. It should be noted that displacements are not evenly distributed throughout the corridor. For example, in densely populated areas, clusters of displacements may occur. Therefore, the rate per mile does not differentiate between densely or sparsely populated areas. The number outside the parentheses represents the total displacements, while inside the rate of displacements. For example, Conceptual Alternative 3A shows 287 (12.7), so that this conceptual alternative has 287 total displacements at a rate of 12.7 displacements per mile. The figures below provide a summary of both combined displacements and rate of displacements per mile. The estimated number of displacements will serve as a proxy until a detailed assessment for each alternative is conducted in accordance with GDOT's Environmental Procedures Manual in the DEIS phase of project development.

In order to aggregate the number of potential displacements, aerial imagery was used to identify impacted structures for each alternative. The corridor was flown in 2012 to obtain geo-referenced, aerial imagery; however, several of the alternatives fall outside the extents of these aerials. Therefore, these aerials were supplemented with 2010 aerials that are publicly available from the United States Department of Agriculture and Google Maps aerials/street view (where available). Based on comparing active construction sites along the corridor, the 2012 aerial imagery and the current Google Maps aerial imagery were collected at similar times.

Cherokee and Forsyth counties provided their latest parcel maps within the study area. This data, along with the impacted structures and Google Maps aerials/street view, was used to identify displacements. Displacements are different than impacted structures because one building does not necessarily constitute one displacement. For example, if one parcel has a house with a separate garage, it would be counted as two structures but only one displacement. Similarly, a strip mall could have one building but hold multiple businesses and was therefore counted as multiple displacements.

Land use maps were provided by Cherokee and Forsyth counties and were used, along with aerials and Google Maps aerials/street view, to identify type of displacement. In the case of a discrepancy between sources, professional judgment was used to assign displacement type. The types of displacement identified are residential, commercial, industrial, and institutional.

Residential displacements include residences, such as houses and apartment complexes. Each house was considered one displacement. Displacements for apartment complexes were estimates based on building height. If a townhome building was impacted, only the townhomes the alternative touched were considered displacements; it was assumed that the building could be renovated to preserve the remaining townhomes.

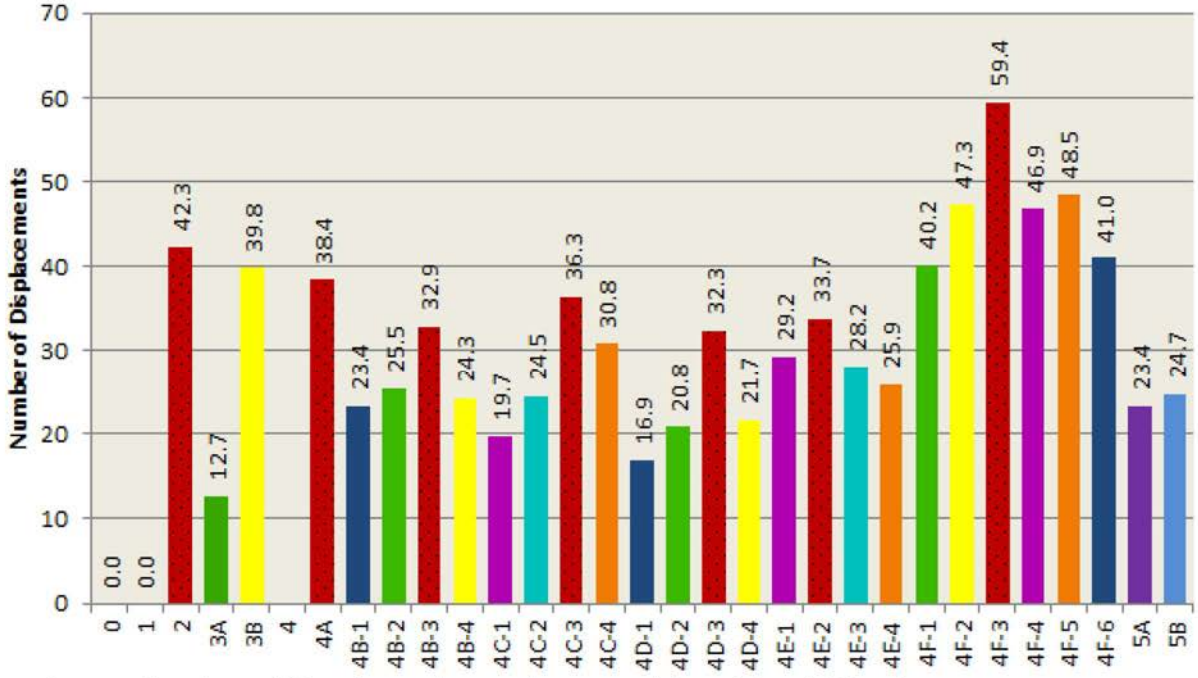
Commercial displacements include businesses and agricultural facilities, such as barns and chicken coops. The number of businesses in a building was estimated using Google Maps street view. Similar to townhome buildings, if a strip mall building was impacted, only the businesses the alternative impacted were considered displacements.

Industrial displacements include manufacturing facilities, poultry plants, and treatment plants.

Institutional displacements include public facilities such as schools, churches, government facilities, and utility sites. Common facilities in neighborhoods (i.e. tennis courts, pools, etc.) were also considered institutional displacements.

The following figure and table provides the dataset of potential displacements, which were calculated using aerial photography.

Figure 21.1 Potential Quantitative and Qualitative Displacements per Mile - All Conceptual Alternatives



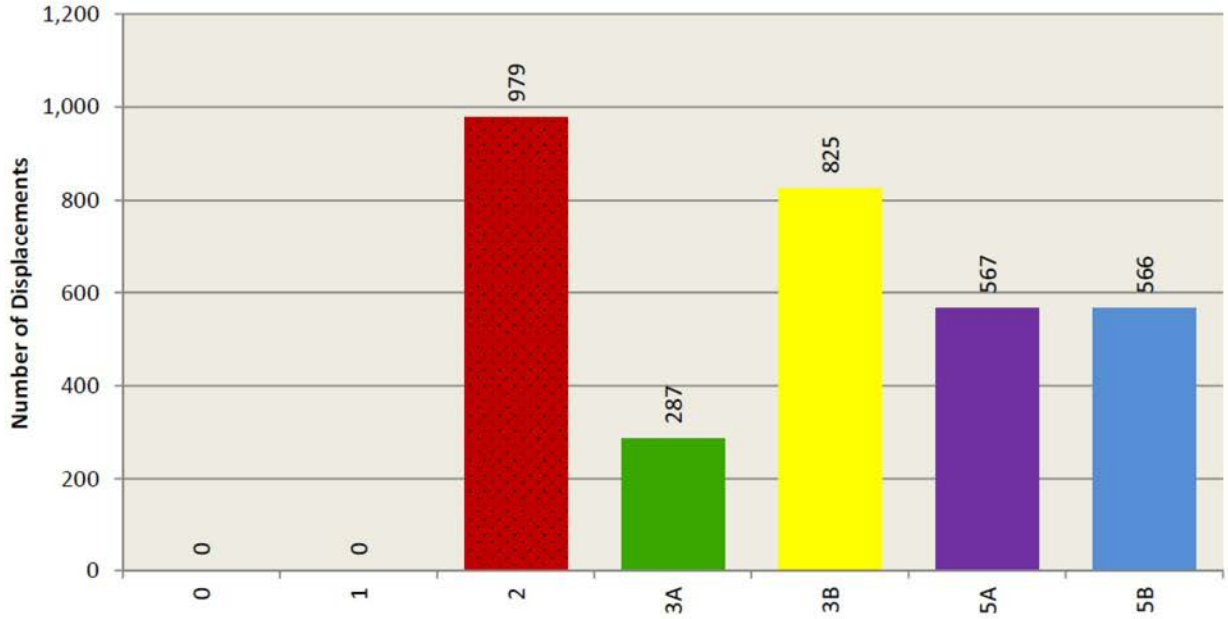
Source: Cherokee and Forsyth counties parcel maps, aerials, and Google Maps imagery

*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

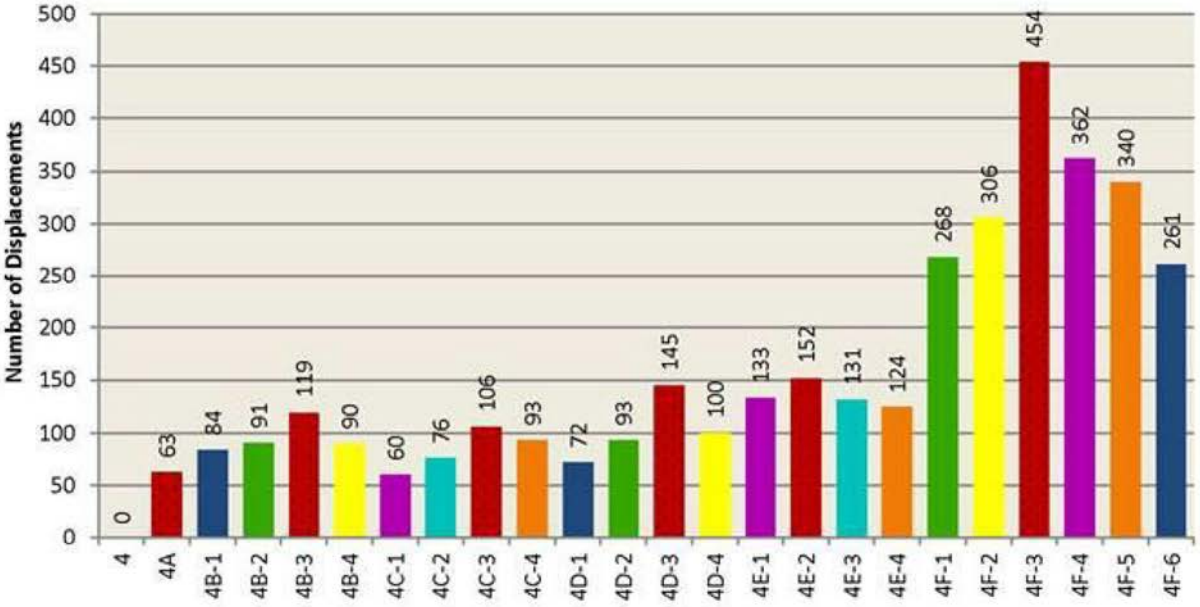
***Note: Displacements may occur in clusters within densely populated areas.

Figure 21.2 Potential Total Displacements - Corridor Alternatives



Source: Cherokee and Forsyth counties parcel maps, aerials, and Google Maps imagery
*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.
**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

Figure 21.3 Potential Total Quantitative and Qualitative Displacements - Conceptual Alternatives - Links



Source: Cherokee and Forsyth counties parcel maps, aerials, and Google Maps imagery
*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.
**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

Table 21.1 Potential Displacements

Conceptual Alternative	Length of Corridor (miles)	Total Displacements (per mile)	Residential	Commercial	Industrial	Institutional	Qualitative
0	0	0 (0)	0	0	0	0	●
1	0	0 (0)	0	0	0	0	●
2	23.16	979 (42.3)	415	523	6	35	◒
3A	22.61	287 (12.7)	251	32	0	4	●
3B	20.73	825 (39.8)	770	50	0	5	◒
4A	1.64	63 (38.4)	32	31	0	0	◒
4B-1	3.59	84 (23.4)	64	19	0	1	◒
4B-2	3.57	91 (25.5)	71	19	0	1	◒
4B-3	3.62	119 (32.9)	81	33	0	5	◒
4B-4	3.70	90 (24.3)	78	9	0	3	◒
4C-1	3.05	60 (19.7)	52	7	0	1	◒
4C-2	3.1	76 (24.5)	65	10	0	1	◒
4C-3	2.92	106 (36.3)	71	32	0	3	◒
4C-4	3.03	93 (30.8)	85	6	0	2	◒
4D-1	4.25	72 (16.9)	56	15	0	1	●
4D-2	4.47	93 (20.8)	69	22	1	1	◒
4D-3	4.49	145 (32.3)	76	62	2	5	◒
4D-4	4.61	100 (21.7)	63	36	0	1	◒
4E-1	4.56	133 (29.2)	86	40	2	5	◒
4E-2	4.51	152 (33.7)	82	61	3	6	◒

Table 21.1 Potential Displacements

Conceptual Alternative	Length of Corridor (miles)	Total Displacements (per mile)	Residential	Commercial	Industrial	Institutional	Qualitative
4E-3	4.65	131 (28.2)	117	12	1	1	◓
4E-4	4.78	124 (25.9)	114	8	1	1	◓
4F-1	6.67	268 (40.2)	177	73	2	16	◓
4F-2	6.47	306 (47.3)	137	143	2	24	○
4F-3	7.64	454 (59.4)	106	328	3	17	○
4F-4	7.27	341 (46.9)	115	204	7	15	○
4F-5	7.48	363 (48.5)	184	145	11	23	○
4F-6	6.36	261 (41.0)	190	49	15	7	◓
5A	24.28	567 (23.4)	375	170	3	19	◓
5B	16.65	566 (34.0)	327	216	5	18	◓

Source: Cherokee and Forsyth counties parcel maps, aerials, and Google Maps imagery

*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

Widening the existing SR 20 would result in 979 total displacements. About 53% of these displacements are commercial displacements, as there are many businesses along the existing road. This alternative has the largest number of displacements of any alternative and was rated as Needs Improvement. The Northern New Location alternative (3A) displacements are mostly residential (~87%). As this alternative has one of the lowest rates of displacements (12.7 displacements per mile), it receives a rating of Exceeds. The Southern New Location alternative (3B) has over 2.5 times the displacements of the Northern New Location. These displacements are still primarily residential (~93%). About a third of the residential displacements come from impacting an apartment complex next I-575. These could potentially be avoided by shifting the alignment to the north or south. This alternative rates as Meets due to its moderate rate of displacements.

The Canton link from I-575 to Buffington has an almost equal amount of residential and commercial displacements. The majority of commercial displacements are a result of the impact to the Canton Marketplace. This alternative rates as Meets due to its moderate rate of displacements.

4B-1 has the least amount of total displacements at 84, while 4B-3 has the most at 119. All alignments result in primarily residential displacements, ranging from 87% for 4B-4 to 68% for

4B-3. There are no industrial displacements for any of the alternatives and relatively few institutional displacements. 4B-1 rates as Exceeds, while the other alternatives rate as Meets.

4C-1 has the least amount of total displacements at 60, while 4C-3 has the most at 106. All of these alternatives result in primarily residential displacements. Compared to the other areas along the corridor, the Macedonia alternatives have a relatively low number of displacements. 4C-1 receives a rating of Exceeds, while 4C-2, 4C-3, and 4C-4 receive a rating of Meets.

4D-1 has the least amount of total displacements at 72, while 4D-3 nearly doubles that amount with the most total displacements at 143. The majority of displacements for 4D-1, 4D-2, and 4D-4 are residential, while 4D-3 is comprised of a more even spread between residential and non-residential displacements. All the Lathemtown alternatives receive a rating of Exceeds, except for 4D-3, which receives a rating of Meets.

4D-4 has the least amount of total displacements at 124, while 4D-3 has the most at 150. Compared to the other areas along the corridor, all the alternatives for Ducktown have a relatively high number of total displacements. 4D-3 and 4D-4 have a very high percentage of residential displacements, while the displacements for 4D-1 and 4D-2 are more evenly distributed. All of these alternatives receive a rating of Meets.

Although 4F-6 has the least amount of total displacements at 261, it also has the most residential displacements at 190. 4F-3 has the most total displacements at 451, but the least amount of residential displacements at 106. As expected, widening along the existing corridor (4F-3) has the most amount of commercial displacements by far. Compared to the other areas, the displacements resulting from these alternatives are more evenly distributed between residential and non-residential, as they are going through the more developed areas of the City of Cumming. 4F-1 and 4F-6 receive a rating of Meets; the rest of the conceptual alternatives in Cumming receive a rating of Needs Improvement.

5A would result in 567 total displacements, with about 66% of those being residential displacements. 5B assumes that SR 20 will be widened from I-575 to Bethelview, then diverted onto the existing Bethelview Rd (programmed to be constructed in 2014/2015); this alternative would result in 566 total displacements. Both of these partial rerouting alternatives receive a rating of Meets.

2.4 Costs/Other

2.4.1 Costs/Other Summary

Costs evaluated in Screen 2 are based on anticipated right of way (ROW), construction (CST), and operations and maintenance costs. ROW costs primarily reflect the amount of additional land (i.e. acres) required for acquisition including improvements, where price variability occurs by land use type (e.g. commercial, residential, agricultural, and industrial). Cost of construction was developed by estimating the main drivers of roadway construction and applying average percentage factors to develop costs for the secondary drivers. The two main drivers for construction costs are pavement (e.g. travel lanes and shoulders) and structures (e.g. bridges) and are estimated by using unit costs for the proposed areas. Secondary drivers for pavement consist of drainage, erosion control, signs, pavement markings, traffic control, and earthwork. Average percentage factors were developed by analyzing historic GDOT project costs and are indexed to the cost of the pavement. Structures do not have any secondary drivers for their construction costs. The factors impacting both ROW and CST cost estimates were calculated via desktop analyses. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

In order to illustrate the relationship of project costs with potential benefits a conceptual alternative can produce, a B/C ratio was calculated for each conceptual alternative (i.e. return on the dollar). The B/C ratio works to compare the user benefits of the conceptual alternative to the construction cost. The B/C ratio was developed based on correlating the benefits of the project with the project Need and Purpose, specifically, in the alternative's ability to address mobility and congestion relief needs.

One conclusion of the Costs/Other Evaluation was the need to develop a specific Marginal Utility Analysis. A marginal utility analysis could be used to quantify the how well an alternative performs for its cost. This analysis is provided in Appendix B.

Table 2.35 illustrates the Costs/Other criteria and the units of analysis that were used for each conceptual alternative. The ratings used for Costs/Other include 'Exceeds', 'Meets', and 'Needs Improvement'. Following this table is a discussion of each Costs/Other criteria, a brief discussion of what the criterion is, how it was assessed, and how the qualitative ratings were applied (to be completed upon agency coordination).

Section 3 provides a comprehensive summary of all performance results. Appendix A provides data for environmental and community impacts results from Screen 2 for each conceptual alternative. Appendix B provides further details of the approach, assumptions, and context for evaluation as well as providing results for each criterion.

Table 2.34 Costs/Other Criteria

Performance Criteria*	Units
Total Costs (including Right of Way, Construction, Operations and Maintenance)	$ (Million)
Benefit/Cost Ratio	B/C
Constructability	Qualitative

*Analysis of these criteria is provided in Sections 2.4.2 – 2.4.7. A summary of results is found in Appendix A, Screen 2 Comprehensive Matrix. Detailed analysis of these criteria is found in Appendix B.

2.4.2 Cost Summary

Project costs were based on the right of way (ROW) costs, construction (CST) costs, and operations and maintenance costs, but the alternatives' costs were grouped into one lump sum category to help illustrate the comprehensive amount of capital investment necessary to construct and maintain each alternative. Among the alternatives, there was an extensive amount of variability in ROW and CST costs to the extent that comparing them could prove challenging. Therefore, to account for this variability, alternatives' total project costs were reported as one lump sum of ROW and CST costs. The costs for operations and maintenance were considered negligible since this component accounted for such a low percentage of the total project costs. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

The costs for conceptual alternatives 3A and 3B were exorbitantly higher than the other corridor widening alternatives, so they were rated as 'Needs Improvement' due to these being over double the average costs of the other widening alternatives (e.g. $615.6 million and $630.2 million, respectively). The average costs for conceptual alternatives 2, 5A, and 5B was $252 million; each of these conceptual alternatives had costs that fell within the range of the average, therefore received a 'Meets' rating. The average combined ROW and CST costs were $68.1M per link for conceptual alternatives 4A, 4B-(1, 2, 3, 4), 4C-(1, 2, 3, 4), 4E-(1, 2, 3, 4), and 4F-(1, 2, 3, 4, 5, 6), therefore all conceptual alternatives with costs falling within the range of greater than $40 million but less than $80 million were considered within the average and received a 'Meets' rating. The conceptual alternatives that were $40 million or less received an 'Exceeds' rating. The TSM conceptual alternative 1 had an estimated cost slightly over $2 million due to the type of improvements being minor in nature, especially since it may not require or only require a minimum amount of ROW. Conceptual alternatives 4A and 4C-3 had project costs under or equal to $40 million. The threshold applied for the 'Needs Improvement' rating was project costs exceeding $80 million, which applied to conceptual alternative 4E-4 and conceptual alternatives 4F-1 thru 6.

Due to the project costs having natural breaks in terms of the cost differential among the alternatives, it assisted with the establishment of the thresholds for which the qualitative ratings were based. A conceptual alternative's cost was not the key determinant factor for evaluating its overall rating; however project costs did have an impact due to it helping

illustrate the degree of monetary investment necessary for implementing a specific alternative.

Ratings Justification: The qualitative ratings used to assess the impact of a conceptual alternative's costs were Exceeds, Meets, and Needs Improvement based on natural breaks. If an alternative's project costs were considerably lower than other alternatives' costs, then it received an 'Exceeds' rating. Alternatives with project costs that fell more in line with the average project costs received a 'Meets' rating. For the cases where an alternative's project costs were considerably higher than the average project costs or were so high that it was challenging to draw practical comparisons, those alternatives received a 'Needs Improvement'.

Table 2.35 Total Costs Qualitative Ratings

Rating	Legend	Alternative(s)
Exceeds	●	0 - No Build; 1 - Transportation Systems Management; 4A-1 - Canton Red (Existing); 4C-3 - Macedonia Red (Existing); 4C-4 - Macedonia Orange (South)
Meets	◒	2 - Widen Existing; 4B-1 - Buffington Blue (North); 4B-2 - Buffington Green (North); 4B-3 - Buffington Red (Existing); 4B-4 - Buffington Yellow (South); 4C-1 - Macedonia Pink (North); 4C-2 - Macedonia Teal (North); 4D-1 - Lathemtown Blue (North); 4D-2 - Lathemtown Green (North); 4D-3 - Lathemtown Red (Existing); 4D-4 - Lathemtown Yellow (South); 4E-1 - Ducktown Pink (North); 4E-2 - Ducktown Red (Existing); 4E-3 - Ducktown Teal (South); 5A - Alt 4 and SR 369; 5B- Alt 4 and Bethelview
Needs Improvement	○	3A - North; 3B - South; 4E-4 - Ducktown Orange (South); 4F-1 - Cumming Green (Sawnee Dr.); 4F-2 - Cumming Yellow (Elm St.); 4F-3 - Cumming Red (Existing); 4F-4 - Cumming Pink (Tolbert St.); 4F-5 - Cumming Orange (Veterans Memorial Blvd.); 4F-6 - Cumming Blue (Chamblee Gap Rd.)

Note: Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.3 Right of Way

The tools used to determine the number and type of land use impacts were GIS and county land use and zoning maps for Forsyth and Cherokee Counties. The primary tool used for calculating ROW costs based on the pre-determined ROW impacts was GDOT's Office of Planning RUCEST (Right of Way and Utility Relocation Cost Estimate Tool). This tool is used to develop right of way planning level cost estimates for a diverse set of project types, ranging from auxiliary lanes, bridges, frontage roads, multi-use trails, turn lanes, sidewalks, roundabouts, and traditional widening projects. The pricing variables used within RUCEST are derived from actual historical data from previously let projects in coordination with GDOT's ROW Office and its Utility Office. Assumptions concerning ROW primarily involved the determination of ROW width (assumed to be 250 feet for conceptual alternatives 2, 4A, 4B[1, 2, 3, 4], 4C[1, 2, 3, 4], 4D[1, 2, 3, 4], 4E[1, 2, 3, 4], 4F[1, 2, 3, 4, 5, 6], 5A and 5B; and assumed to be 300 feet for conceptual alternatives 3A and 3B), inventorying land use types (i.e., commercial, residential, industrial, agricultural), and counting the number of improvements and displacements by land use type. Additionally, the particular county an alternative was located is a significant variable to capture. Appendix B provides additional details on the evaluation of this criterion. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.4 Construction

Construction costs estimates for this analysis also include bridges and interchanges. The assumptions for pavement widths are 65 feet for four lane facilities; 89 feet for six lane facilities, and 92 feet for conceptual alternatives 3A and 3B. The primary tool utilized for calculating construction costs is GDOT's CES (Cost Estimating System).

There was variability in costs for roadway segments on existing alignment compared to segments on new alignment; the same applies to the contingency percentage as well which is covered in a later section of this report. The differential between new alignment and existing alignment is attributed to the amount of earthwork necessary, whereas less earthwork is required for widening on existing alignment compared to a substantial amount more required for new alignments segments. Appendix B provides additional details on the evaluation of this criterion. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.5 Operations and Maintenance

Calculating the anticipated costs of maintaining a new or improved roadway facility for SR 20 is captured in operations and maintenance. These costs are typically based on maintaining quality pavement, bridges, and signage along the corridor; however, most of these cost items are difficult to project due to them being based on the severity of need as well as being tied to scheduled inspections. Therefore, operations and maintenance costs were based on resurfacing, since resurfacing needs are easily foreseeable and anticipated. It was assumed that a roadway facility will be resurfaced at least twice within its 20 year design life. The key driver in resurfacing costs is the amount of pavement needed (i.e. square yard and tonnage).

Costs are expressed in terms of annual projections by dividing the total construction costs by 20 to represent the design life of twenty years. The total construction costs are based on the total number of miles to repave/resurface. The constant variable used for each conceptual alternative was $54 per ton for asphalt. Appendix B provides additional

details on the evaluation of this criterion. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.6 Benefit/Cost Ratio

The Benefits-to-Cost (B/C) Ratio developed for this project measures the benefits, as related to the Need and Purpose objectives, and compares them to the total project costs. The Need and Purpose objectives for the SR 20 Corridor Improvements project are: improve Mobility, reduce Congestion, and improve Safety along the corridor. Mobility can be measured using monetized travel time savings and is the basis of the B/C ratio. Congestion reduction is discussed further in Appendix B, and safety could not be included at this time due to the complexity of the analysis being inconsistent with the level of design at this Screen 2 Alternatives Analysis phase.

The benefit calculated for the B/C ratio represents, in dollars, the time saved for a single user on a single trip if a conceptual alternative were constructed. The cost calculated for the B/C ratio represents the total project cost (right-of-way acquisition and construction) required for that user to make the same trip. Appendix B provides additional details on the evaluation of this criterion.

Since this metric does not calculate monetized benefits associated with V/C ratio and safety improvements, its results should not be used as a primary criterion for decision-making. The results of this analysis provide a level of sensitivity to other, stronger criteria and should be used to fine-tune rankings of conceptual alternatives. If this metric is combined with the results of the marginal utility analysis, it can provide better clarity on how a particular conceptual alternative performs associated with the Need and Purpose objectives for this project. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

Ratings Justification: The natural breaks in the quantitative data fall into the following ranges and were assigned the corresponding qualitative ratings:

- B/C ratio > 3.8 - Exceeds
- 2.0 >B/C ratio < 3.8 - Meets
- B/C ratio < 2.0 - Needs Improvement

Table 2.36 Benefit/Cost Qualitative Ratings

Rating	Legend	Alternative(s)
Exceeds	●	1 - Transportation Systems Management 4B-1 - Buffington Blue (North) 4B-2 - Buffington Green (North) 4B-3 - Buffington Red (Existing) 4B-4 - Buffington Yellow (South) 4C-4 - Macedonia Orange (South) 4D-4 - Lathemtown Yellow (South) 4F-1 - Cumming Green (Sawnee Dr.) 4F-6 - Cumming Blue (Chamblee Gap Rd.)
Meets	◒	2 - Widen Existing 3A - North 3B - South 4C-1 - Macedonia Pink (North) 4C-2 - Macedonia Teal (North) 4D-1 - Lathemtown Blue (North) 4D-2 - Lathemtown Green (North) 4E-1 - Ducktown Pink (North) 4E-3 - Ducktown Teal (South) 4E-4 - Ducktown Orange (South) 4F-2 - Cumming Yellow (Elm St.) 4F-3 - Cumming Red (Existing) 4F-4 - Cumming Pink (Tolbert St.) 4F-5 - Cumming Orange (Veterans Memorial Blvd.) 5A - Alt 4 and SR 369
Needs Improvement	○	0 - No Build 4A-1 - Canton Red (Existing) 4C-3 - Macedonia Red (Existing) 4D-3 - Lathemtown Red (Existing) 4E-2 - Ducktown Red (Existing) 5B- Alt 4 and Bethelview

Note: Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.7 Constructability

The constructability measure for the SR 20 Alternatives Analysis provides a qualitative measure for the risks associated with the construction cost or overall project schedule. Risk identifies areas of uncertainty in the project's construction cost or overall project schedule that are reasonably foreseeable at the early stage in project development. The method for determining constructability for the SR 20 Corridor Improvement Project's alternatives consists of three categories: structural, roadway, and community impacts to schedule risks. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

1) Structural risks identify risks associated with the construction of major structures (bridges or tunnels), construction of roadway on embankment, and with right-of-way acquisition. Structural risks for cost and project schedule are mostly dependent on the number of structures constructed and the complexity of the construction. For example, standard GDOT bridges do not require complex construction techniques or staging practices to construct, whereas long-span bridges require complex staging and maintenance of traffic practices to properly construct. Additionally, a vast number of bridges on an alternative may increase its risk for cost (availability of materials) and/or schedule (takes longer to construct numerous bridges).
2) Roadway risks for cost and project schedule are mostly dependent on the complexity of construction staging or building the alternative under traffic. For example, a new location facility does not require much construction staging while vehicles are present, as the construction occurs in areas where no vehicles travel. Alternatively, a standard roadway widening provides a moderate level of risk to schedule as the construction of new roadway components must be constructed piecemeal as opposed to all at once. Lastly, very complex roadway staging typically requires extensive temporary pavement and several detours to construct under traffic.
3) Community Impacts to Schedule risks for cost and project schedule are mostly dependent on the number of properties required to acquire prior to the construction of the project. For example, in urban areas where there are numerous acquisitions, the project schedule can be highly uncertain as numerous negotiations with property owners must occur. However, in rural and largely undeveloped areas, right-of-way acquisition occurs at a fast pace as there are fewer property owners. Risks associated with construction cost typically are associated with improvements that are negotiated into the project. An example is for the Georgia DOT to construct a retaining wall on a property to minimize the total amount of property acquired.

Appendix B provides additional details on the evaluation of this criterion.

***Ratings Justification**:* All three risk categories are aggregated together (for comparison purposes) to form an overall constructability rating. This constructability rating represents the total uncertainty to the construction cost and project schedule for an alternative. These evaluations are based solely on professional judgment by a licensed engineer.

- Exceeds – Low risk alternative
- Meets – Medium risk alternative
- Needs Improvement – High risk alternative

Table 2.37 Constructability Qualitative Ratings

Rating	Legend	Alternative(s)
Exceeds	●	0 - No Build; 1 - Transportation Systems Management; 4A-1 - Canton Red (Existing); 4B-1 - Buffington Blue (North); 4B-2 - Buffington Green (North); 4B-4 - Buffington Yellow (South); 4C-1 - Macedonia Pink (North); 4C-4 - Macedonia Orange (South); 4D-1 - Lathemtown Blue (North); 4D-2 - Lathemtown Green (North); 4E-1 - Ducktown Pink (North); 4E-3 - Ducktown Teal (South); 4E-4 - Ducktown Orange (South); 4F-1 - Cumming Green (Sawnee Dr.); 4F-6 - Cumming Blue (Chamblee Gap Rd.)
Meets	◒	2 - Widen Existing; 3A - North; 4B-3 - Buffington Red (Existing); 4C-2 - Macedonia Teal (North); 4C-3 - Macedonia Red (Existing); 4D-3 - Lathemtown Red (Existing); 4D-4 - Lathemtown Yellow (South); 4E-2 - Ducktown Red (Existing); 4F-2 - Cumming Yellow (Elm St.); 4F-5 - Cumming Orange (Veterans Memorial Blvd.); 5A - Alt 4 and SR 369; 5B- Alt 4 and Bethelview
Needs Improvement	○	3B - South; 4F-3 - Cumming Red (Existing); 4F-4 - Cumming Pink (Tolbert St.)

* Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming)

PI's: 0003681, 0002862, 0003682

	Screen 2 Performance Criteria	Units	Alternatives								
			0. No Build	1. Transportation Systems Mngmt (Localized Improvements)	1. Qualitative	2. Widen Existing	2. Qualitative	3A New Location (North)	3A. Qualitative	3B. New Location (South)	3B. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	total congested trip time 197 minutes	qualitative	F	reduced by 72 minutes	E	reduced by 67 minutes	E	reduced by 77 minutes	E
	User Benefits	Hours of Delay (Total)	11,200 cumulative hours of delay	qualitative	F	reduced by 2,700	M	reduced by 6,000	E	reduced by 7,200	E
		Fuel Saved (per capita)	Cumulative consumption 510 gallons	qualitative	F	88.2	E	94.5	E	101.6	E
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	1.03	qualitative	F	0.93	F	0.95	F	0.89	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	2.28	qualitative	F	1.85	M	1.94	M	1.80	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	320,400 total trips	qualitative	F	335,200	M	318,300	F	317,500	F
	Access management	Qualitative	F		F		M		M		M
	Safety	Qualitative	F		F		M		M		M
	Overall Performance	**Qualitative**	**F**		**F**		**F**		**F**		**F**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	0	0	E	11385.2 (491.6)	M	35794.9 (1583.1)	NI	39834 (1921.6)	NI
	Wetlands	Acres (Acres/mile)	0	0	E	2.1 (0.1)	M	4.9 (0.2)	M	19.3 (0.9)	NI
	Lakes & Ponds	Acres (Acres/mile)	0	0	E	1.4 (0.1)	M	2.2 (0.1)	M	6.9 (0.3)	NI
	Floodplains	Acres (Acres/mile)	0	0	E	28.6 (1.2)	M	128.7 (5.7)	NI	203.4 (9.8)	NI
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0	0	E	29.8 (1.1)	NI	12.3 (0.5)	NI	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0	0	E	4.3 (0.2)	NI	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	0	0	E	2366.8 (102.2)	E	35496 (1,583.2)	NI	22840 (1,101.8)	NI
	Protected Species	#	0	0	E	6	NI	6	NI	6	NI
	Noise Receptors	# (#/mile)	0 (0)	0 (0)	E	979 (42.3)	M	287 (12.7)	E	825 (39.8)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	0	0	E	45.5%	M	60.0%	NI	31.3%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0	0	E	34.8%	M	33.3%	M	37.5%	M
	Farmland	Acres (Acres/mile)	0 (0)	0 (0)	E	208.3 (8.9)	E	384.5 (17.1)	M	492.4 (23.8)	NI
	Number of Displacements	# of Structures (#/mile)	0 (0)	0 (0)	E	979 (42.3)	M	287 (12.7)	E	825 (39.8)	M
	Residential	# of Structures	0	0		415		251		770	
	Commercial	# of Structures	0	0		523		32		50	
	Industrial	# of Structures	0	0		6		0		0	
	Institutional	# of Structures	0	0		35		4		5	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	0 (0)/ (0)	0 (0) / (0)	E	406 (614.2)/ (17.53)	NI	64 (392.75) / (2.83)	M	84 (357.27) / (4.05)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	0	0	E	4	M	2	NI	5	M
	Cemeteries	#	0	0	E	7	NI	0	E	2	NI
	Native American Interests	#	0	0	E	0	E	2	NI	3	M
	Air Quality	Qualitative	N/A		M		M		M		M
	Indirect and Cumulative Effects	Qualitative	M		M		M		M		M
	Construction Impacts	Qualitative	E		E		NI		E		M
	Mitigation / Avoidance Potential ($Million)*	Qualitative	E (0)		E (0)		NI (2.8)		M (8.3)		M (9.1)
	Overall Impacts	**Qualitative**	**E**		**E**		**M**		**M**		**M**
Costs/ Other	Total Costs	$ (Million)	0 [E]	2.82	E	280.22	M	616.42	NI	630.86	NI
	Right of Way (250')	$ (Million)	0	N/A		137.7		94		88.9	
	Construction	$ (Million)	0	2.3		142.6		521.7		541.3	
	Operations & Maintenance	$ (Million) /year	0.52	0.52		0.52		0.72		0.66	
	Benefit/Cost Ratio	B/C	NI	qualitative	E	3.0	M	2.3	M	2.5	M
	Constructability	Qualitative	E		E		M		M		NI
	Marginal Utility	Qualitative	NI		NI		M		NI		NI
	Overall Costs	**Qualitative**	**NI**		**NI**		**M**		**NI**		**NI**
	Overall	**Qualitative**	**F**		**F**		**M**		**F**		**F**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B

Distances of Alternatives:
0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
3A = 22.6 miles; 3B = 20.7 miles;
4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming) PI's: 0003681, 0002862, 0003682			Alternatives									
			4A. Canton		4B. Buffington							
Screen 2 Performance Criteria		**Units**	4A. I-575 to Scott Blvd	4A. Qualitative	4B-1. Blue (North)	4B-1. Qualitative	4B-2. Green (North)	4B-2. Qualitative	4B-3. Red (Existing)	4B-3. Qualitative	4B-4. Yellow (South)	4B-4. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 0 minutes	F	reduced by 27 minutes	E	reduced by 27 minutes	E	reduced by 22 minutes	E	reduced by 27 minutes	E
	User Benefits	Hours of Delay (Total)	increased by 100	F	reduced by 2,300	E	reduced by 2,300	E	reduced by 1,500	E	reduced by 2,300	E
		Fuel Saved (per capita)	0.1	M	13	M	13.3	M	14.2	M	13.3	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.82	M	0.46	M	0.46	M	0.8	M	0.46	M
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.48	M	1.11	E	1.11	E	1.5	M	1.11	E
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,200	M	335,800	E	335,800	E	335200	E	335,800	E
	Access management	Qualitative		M		M		M		M		M
	Safety	Qualitative		M		M		M		M		M
	Overall Performance	**Qualitative**		**F**		**M**		**M**		**M**		**M**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	0 (0)	E	3328.4 (927.1)	M	2378.2 (666.3)	M	0 (0)	E	1696.5 (458.5)	M
	Wetlands	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Lakes & Ponds	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0.0)	E
	Floodplains	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	4.3 (1.2)	NI	0.9 (0.3)	NI
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	4.3 (1.2)	NI	0.9 (0.3)	NI
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	0 (0)	E	3328 (927)	NI	2379 (666.3)	M	0 (0)	E	1697 (458.6)	M
	Protected Species	#	0	E	6	NI	6	NI	3	NI	6	NI
	Noise Receptors	# (#/mile)	83 (38.4)	M	84 (23.4)	M	91 (25.5)	M	119 (32.9)	M	90 (24.3)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	50.0%	M	50.0%	M	50.0%	M	50.0%	M	50.0%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	100.0%	NI	50.0%	M	50.0%	M	50.0%	M	50.0%	M
	Farmland	Acres (Acres/mile)	37.95 (17.0)	M	35.5 (9.9)	E	36.8 (10.3)	E	36.3 (10.0)	E	35.3 (9.5)	E
	Number of Displacements	# of Structures (#/mile)	83 (38.4)	M	84 (23.4)	M	91 (25.5)	M	119 (32.9)	M	90 (24.3)	M
	Residential	# of Structures	32		64		71		81		78	
	Commercial	# of Structures	51		19		19		33		9	
	Industrial	# of Structures	0		0		0		0		0	
	Institutional	# of Structures	0		1		1		5		3	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	15 (39.231 / 9.15)	M	52 (104.3)/ (14.48)	M	62 (127.5) / (17.37)	M	74 (177.3) / (20.44)	M	39 (82.4)/ (10.54)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	1	M	0	E	0	E	0	E	0	E
	Cemeteries	#	0	E	0	E	0	E	2	NI	0	E
	Native American Interests	#	0	E	0	E	0	E	0	E	0	E
	Air Quality	Qualitative		M		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M		M
	Construction Impacts	Qualitative		NI		E		E		M		E
	Mitigation / Avoidance Potential ($Million)*	Qualitative		NI (0)		M (0.6)		E (0.5)		M (0)		M (0.3)
	Overall Impacts	**Qualitative**		**M**		**NI**		**NI**		**M**		**M**
Costs/ Other	Total Costs	$ (Million)	15.25	E	50.69	M	55.99	M	84.39	M	54.79	M
	Right of Way (250')	$ (Million)	8.4		15.8		21.8		23.1		18.9	
	Construction	$ (Million)	6.8		34.8		34.1		21.2		35.8	
	Operations & Maintenance	$ (Million) /year	0.05		0.09		0.09		0.09		0.09	
	Benefit/Cost Ratio	B/C	0.1	NI	5.1	E	4.6	E	4.3	E	4.9	E
	Constructability	Qualitative		F		E		E		M		E
	Marginal Utility	Qualitative		M		M		M		M		M
	Overall Costs	**Qualitative**		**M**		**M**		**M**		**M**		**M**
	Overall	**Qualitative**		**M**		**F**		**F**		**M**		**M**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B
Distances of Alternatives:
0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
3A = 22.6 miles; 3B = 20.7 miles;
4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming) PI's: 0003681, 0002862, 0003682			Alternatives							
			4C. Macedonia							
	Screen 2 Performance Criteria	Units	4C-1. Pink (North)	4C-1. Qualitative	4C-2. Blue (North)	4C-2. Qualitative	4C-3. Red (Existing)	4C-3. Qualitative	4C-4. Orange (South)	4C-4. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 11 minutes	M	reduced by 11 minutes	M	reduced by 6 minutes	P	reduced by 11 minutes	M
	User Benefits	Hours of Delay (Total)	reduced by 800	E	reduced by 800	E	reduced by 50	P	reduced by 800	E
		Fuel Saved (per capita)	16.3	M	15.8	M	12.3	M	16.5	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.86	F	0.86	F	0.93	F	0.86	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.71	M	1.71	M	1.85	M	1.71	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,100	M	335,100	M	335,700	M	335,100	M
	Access management	Qualitative		M		M		M		M
	Safety	Qualitative		M		M		M		M
	Overall Performance	**Qualitative**		**F**		**F**		**F**		**F**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	3670.0 (1203.3)	NI	1027.7 (331.5)	M	402.8 (35.2)	E	1350.8 (445.8)	M
	Wetlands	Acres (Acres/mile)	0 (0)	E	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E
	Lakes & Ponds	Acres (Acres/mile)	0.4 (0.13)	M	0.1 (0.05)	M	0.2 (0.1)	M	0 (0)	E
	Floodplains	Acres (Acres/mile)	1.8 (0.6)	M	1.8 (0.6)	M	1.8 (0.6)	M	1.8 (0.6)	M
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	36.0 (11.8)	NI	35.7 (11.5)	NI	10.3 (3.5)	NI	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	3670 (1,203.3)	NI	1028 (331.6)	M	103 (35.2)	E	1351 (445.8)	M
	Protected Species	#	6	NI	6	NI	6	NI	6	NI
	Noise Receptors	# (#/mile)	60 (19.7)	M	76 (24.5)	M	106 (36.3)	M	93 (30.8)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	33.3%	M	33.3%	M	33.3%	M	33.3%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0.0%	E	0.0%	E	0.0%	E	0.0%	E
	Farmland	Acres (Acres/mile)	58.5 (19.2)	M	45.6 (14.7)	M	33.7 (11.5)	E	58.6 (19.3)	M
	Number of Displacements	# of Structures (#/mile)	60 (19.7)	M	76 (24.5)	M	106 (36.3)	M	93 (30.8)	M
	Residential	# of Structures	52		65		74		85	
	Commercial	# of Structures	7		10		32		6	
	Industrial	# of Structures	0		0		0		0	
	Institutional	# of Structures	1		1		3		2	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	25 (55.8) / (8.20)	M	48 (87.4) / (15.48)	M	55 (69.9)/ (19.64)	M	18 (68.8)/ (5.94)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	1	M	1	M	1	M	0	E
	Cemeteries	#	0	E	0	E	1	NI	0	E
	Native American Interests	#	0	E	0	E	0	P	0	E
	Air Quality	Qualitative		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M
	Construction Impacts	Qualitative		E		E		NI		E
	Mitigation / Avoidance Potential ($Million)*	Qualitative		M (0.8)		M (0.2)		NI (0.06)		M (0.3)
	Overall Impacts	**Qualitative**		**NI**		**NI**		**M**		**M**
Costs/ Other	Total Costs	$ (Million)	47.37	M	49.97	M	39.57	E	39.67	E
	Right of Way (250')	$ (Million)	18.7		23.9		23.9		12.5	
	Construction	$ (Million)	28.6		26		15.6		27.1	
	Operations & Maintenance	$ (Million) /year	0.07		0.07		0.07		0.07	
	Benefit/Cost Ratio	B/C	3.8	M	3.2	M	1.8	NI	3.9	E
	Constructability	Qualitative		E		M		M		E
	Marginal Utility	Qualitative		M		M		M		M
	Overall Costs	**Qualitative**		**M**		**M**		**M**		**M**
	Overall	**Qualitative**		**F**		**F**		**M**		**M**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B
Distances of Alternatives:
0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
3A = 22.6 miles; 3B = 20.7 miles;
4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming) PI's: 0003681, 0002862, 0003682			Alternatives							
			4D. Lathemtown							
Screen 2 Performance Criteria		**Units**	4D-1. Blue (North)	4D-1. Qualitative	4D-2. Green (North)	4D-2. Qualitative	4D-3. Red (Existing)	4D-3. Qualitative	4D-4. Yellow (South)	4D-4. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 20 minutes	M	reduced by 20 minutes	M	reduced by 14 minutes	M	reduced by 20 minutes	M
	User Benefits	Hours of Delay (Total)	reduced by 1,600	E	reduced by 1,600	E	reduced by 500	F	reduced by 1,600	E
		Fuel Saved (per capita)	16.8	M	14.6	M	20.6	M	13.2	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.79	M	0.79	M	0.88	I	0.79	M
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.48	M	1.48	M	1.71	M	1.48	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	334,800	M	334,800	M	335,700	M	334,800	M
	Access management	Qualitative		M		M		M		M
	Safety	Qualitative		M		M		M		M
	Overall Performance	**Qualitative**		**M**		**M**		**F**		**M**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	2876.6 (676.8)	M	2228.0 (498.4)	M	2194.5 (468.8)	M	2412.0 (523.2)	M
	Wetlands	Acres (Acres/mile)	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E
	Lakes & Ponds	Acres (Acres/mile)	0.8 (0.2)	M	1.3 (0.3)	NI	0.4 (0.1)	M	1.9 (0.4)	NI
	Floodplains	Acres (Acres/mile)	13.1 (3.1)	NI	12.0 (2.7)	NI	10.7 (2.4)	NI	10.7 (2.3)	NI
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	2877 (678.8)	M	2228 (498.4)	M	2195 (488.9)	M	2412 (523.2)	M
	Protected Species	#	6	NI	6	NI	6	NI	6	NI
	Noise Receptors	# (#/mile)	72 (16.9)	E	93 (20.8)	M	145 (32.3)	M	100 (21.7)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	25.0%	E	25.0%	E	20.0%	E	20.0%	E
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0.0%	E	0.0%	E	0.0%	E	0.0%	E
	Farmland	Acres (Acres/mile)	74.3 (17.5)	M	68.1 (15.2)	M	43.2 (9.6)	E	49.9 (10.8)	E
	Number of Displacements	# of Structures (#/mile)	72 (16.9)	E	93 (20.8)	M	145 (32.3)	M	100 (21.7)	M
	Residential	# of Structures	56		69		78		63	
	Commercial	# of Structures	15		22		62		36	
	Industrial	# of Structures	0		1		2		0	
	Institutional	# of Structures	1		1		5		1	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	41 (136.5) / (9.65)	M	53 (132.6) / (11.86)	M	80 (150.0) / (20.04)	M	63 (147.1) / (13.67)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	3	M	1	M	1	M	2	M
	Cemeteries	#	0	E	0	E	1	NI	0	E
	Native American Interests	#	3	M	1	M	1	M	1	M
	Air Quality	Qualitative		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M
	Construction Impacts	Qualitative		E		M		M		M
	Mitigation / Avoidance Potential ($Million)*	Qualitative		M (0.5)		M (0.4)		NI (0.3)		M (0.6)
	Overall Impacts	**Qualitative**		**M**		**NI**		**M**		**NI**
Costs/ Other	Total Costs	$ (Million)	65.4	M	75.8	M	65.59	M	60	M
	Right of Way (250')	$ (Million)	26.7		36		40.2		22.5	
	Construction	$ (Million)	38.6		39.7		25.0		37.4	
	Operations & Maintenance	$ (Million) /year	0.1		0.1		0.09		0.1	
	Benefit/Cost Ratio	B/C	3.3	M	3	M	1.8	NI	3.9	E
	Constructability	Qualitative		E		E		M		M
	Marginal Utility	Qualitative		M		M		M		M
	Overall Costs	**Qualitative**		**M**		**M**		**M**		**M**
	Overall	**Qualitative**		**M**		**F**		**M**		**F**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B
Distances of Alternatives:
0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
3A = 22.6 miles; 3B = 20.7 miles;
4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming) PI's: 0003681, 0002862, 0003682			Alternatives							
			4E. Ducktown							
Screen 2 Performance Criteria		**Units**	4E-1. Pink (North)	4E-1. Qualitative	4E-2. Red (Existing)	4E-2. Qualitative	4E-3. Blue (South)	4E-3. Qualitative	4E-4. Orange (South)	4E-4. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 8 minutes	F	reduced by 5 minutes	F	reduced by 8 minutes	F	reduced by 8 minutes	F
	User Benefits	Hours of Delay (Total)	reduced by 500	F	reduced by 100	F	reduced by 500	F	reduced by 500	F
		Fuel Saved (per capita)	15.2	M	16.2	M	14.1	M	12.4	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.73	M	0.84	M	0.73	M	0.73	M
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.40	M	1.80	M	1.40	M	1.40	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,000	M	335,200	M	335,000	M	335,000	M
	Access management	Qualitative		M		M		M		M
	Safety	Qualitative		M		M		M		M
	Overall Performance	**Qualitative**		**F**		**F**		**F**		**F**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	5762.9 (1263.8)	NI	2148.0 (473.8)	M	5503.1 (1183.5)	NI	4650.2 (972.84)	M
	Wetlands	Acres (Acres/mile)	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E
	Lakes & Ponds	Acres (Acres/mile)	0 (0)	E	0.9 (0.2)	M	3.4 (0.7)	NI	3.3 (0.7)	NI
	Floodplains	Acres (Acres/mile)	8.6 (1.5)	M	2.0 (0.4)	M	8.3 (1.8)	M	12.6 (2.6)	NI
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	4729 (1,037.1)	NI	314 (69.7)	E	144 (31)	E	144 (30.1)	E
	Protected Species	#	6	NI	6	NI	6	NI	6	NI
	Noise Receptors	# (#/mile)	133 (29.2)	M	152 (33.7)	M	131 (28.2)	M	124 (25.9)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	50.0%	M	42.9%	M	50.0%	M	50.0%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0.0%	E	0.0%	E	0.0%	E	0.0%	E
	Farmland	Acres (Acres/mile)	65.5 (14.4)	M	46.4 (10.3)	E	102.1 (22.0)	NI	68.9 (14.4)	M
	Number of Displacements	# of Structures (#/mile)	133 (29.2)	M	152 (33.7)	M	131 (28.2)	M	124 (25.9)	M
	Residential	# of Structures	88		82		117		114	
	Commercial	# of Structures	40		61		12		8	
	Industrial	# of Structures	2		3		1		1	
	Institutional	# of Structures	5		6		1		1	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	77 (171.7)/ (16.89)	M	95 (190.4)/ (21.00)	M	31 (151.1)/ (6.67)	M	31 (110.1)/ (6.49)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	1	M	1	M	0	E	1	NI
	Cemeteries	#	1	NI	1	NI	0	E	0	E
	Native American Interests	#	0	E	0	E	0	E	0	E
	Air Quality	Qualitative		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M
	Construction Impacts	Qualitative		E		NI		M		M
	Mitigation / Avoidance Potential ($Million)*	Qualitative		E (1.1)		M (0.6)		E (1.7)		E (1.1)
	Overall Impacts	**Qualitative**		**M**		**M**		**NI**		**NI**
Costs/ Other	Total Costs	$ (Million)	75.4	M	54.68	M	73.81	M	85.81	NI
	Right of Way (250')	$ (Million)	39.1		34.5		24.5		32.6	
	Construction	$ (Million)	36.2		20.1		49.2		53.1	
	Operations & Maintenance	$ (Million) /year	0.1		0.08		0.11		0.11	
	Benefit/Cost Ratio	B/C	2.8	M	1.8	NI	2.9	M	2.6	M
	Constructability	Qualitative		E		M		E		E
	Marginal Utility	Qualitative		M		M		M		M
	Overall Costs	**Qualitative**		**M**		**M**		**M**		**M**
	Overall	**Qualitative**		**M**		**M**		**F**		**F**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B
Distances of Alternatives:
0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
3A = 22.6 miles; 3B = 20.7 miles;
4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming) PI's: 0003681, 0002862, 0003682			Alternatives 4F. Cumming											
	Screen 2 Performance Criteria	Units	4F-1. Green (North)	4F-1. Qualitative	4F-2. Yellow (North)	4F-2. Qualitative	4F-3. Red (Existing)	4F-3. Qualitative	4F-4. Pink (South)	4F-4. Qualitative	4F-5. Orange Veterans Memorial	4F-5. Qualitative	4F-6. Blue (South) - Chamblee Gap	4F-6. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 20 minutes	M	reduced by 25 minutes	E	reduced by 25 minutes	E	reduced by 25 minutes	E	reduced by 25 minutes	E	reduced by 19 minutes	M
	User Benefits	Hours of Delay (Total)	reduced by 1,500	M	reduced by 600	F	reduced by 600	F	reduced by 600	F	reduced by 600	F	reduced by 1,700	M
		Fuel Saved (per capita)	36.1	M	31.1	M	31.1	M	31.1	M	31.1	M	41.6	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.94	F	0.95	F	0.95	F	0.95	F	0.95	F	0.97	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.96	F	2.01	F	2.01	F	2.01	F	2.01	F	2.09	F
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,300	M	335,200	M	335,200	M	335,200	M	335,200	M	337,900	M
	Access management	Qualitative		M		M		M		M		M		M
	Safety	Qualitative		M		M		M		M		M		M
	Overall Performance	**Qualitative**		**F**		**F**		**F**		**F**		**F**		**F**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	6555.7 (982.86)	M	6185.7 (956.06)	M	7167.1 (940.71)	M	11592.7 (1549.82)	NI	8708.39 (1197.85)	NI	9015.7 (1417.57)	NI
	Wetlands	Acres (Acres/mile)	0 (0.0)	E	2.1 (0.32)	M	2.1 (0.27)	M	2.1 (0.28)	M	0.8 (0.11)	M	5.1 (0.8)	NI
	Lakes & Ponds	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	1.2 (0.2)	M	0.5 (0.07)	M	1.0 (0.2)	M
	Floodplains	Acres (Acres/mile)	9.7 (1.5)	M	9.9 (1.5)	M	14.8 (1.9)	M	15 (2)	M	15.1 (2.1)	M	20.4 (3.2)	NI
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	11.2 (1.7)	NI	15.7 (2.4)	NI	11.2 (1.5)	NI	11.2 (1.5)	NI	11.2 (1.6)	NI	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	4.4 (0.7)	NI	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species	#	3	NI	3	NI	3	NI	3	NI	3	NI	3	NI
	Noise Receptors	# (#/mile)	268 (40.2)	M	306 (47.3)	NI	454 (59.4)	NI	341 (46.9)	NI	363 (48.5)	NI	261 (41.0)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	66.7%	NI	63.6%	NI	58.3%	NI	66.7%	NI	66.7%	NI	63.6%	NI
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	33.3%	M	54.5%	NI	58.3%	NI	50.0%	M	50.0%	M	45.50%	M
	Farmland	Acres (Acres/mile)	29.7 (4.5)	E	37.5 (5.8)	E	45.2 (5.9)	E	52.4 (7.0)	E	61.3 (8.4)	E	100 (15.7)	M
	Number of Displacements	# of Structures (#/mile)	268 (40.2)	M	306 (47.3)	NI	454 (59.4)	NI	341 (46.9)	NI	363 (48.5)	NI	261 (41.0)	M
	Residential	# of Structures	177		137		306		115		184		190	
	Commercial	# of Structures	73		143		328		204		145		49	
	Industrial	# of Structures	2		2		3		7		11		15	
	Institutional	# of Structures	16		24		17		15		23		7	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	72 (109.8)/ (10.79)	M	101 (138.8)/ (15.61)	M	110 (121.2) / (14.40)	NI	83 (141.4) / (11.42)	NI	94 (118.3) / (12.57)	M	37 (84.0)/ (5.82)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	0	E	0	E	0	E	0	E	0	E	1	M
	Cemeteries	#	0	E	0	E	2	NI	1	NI	0	E	0	E
	Native American Interests	#	0	E	0	E	0	E	0	E	0	E	0	E
	Air Quality	Qualitative		M		M		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M		M		M
	Construction Impacts	Qualitative		M		NI		NI		NI		NI		M
	Mitigation / Avoidance Potential ($Million)*	Qualitative		E (1.2)		E (1.5)		NI (1.8)		M (2.3)		E (1.6)		E (2.5)
	Overall Impacts	**Qualitative**		**M**		**M**		**M**		**M**		**M**		**F**
Costs/ Other	Total Costs	$ (Million)	101.59	NI	94.68	NI	121.11	NI	91.97	NI	117.52	NI	86.88	NI
	Right of Way (250')	$ (Million)	45.9		47.1		70.8		49		54.8		32.1	
	Construction	$ (Million)	55.5		47.4		50.1		42.8		62.5		54.6	
	Operations & Maintenance	$ (Million) /year	0.19		0.18		0.21		0.17		0.22		0.18	
	Benefit/Cost Ratio	B/C	4.6	E	2.8	M	2.4	M	2.5	M	3.3	M	4.6	E
	Constructability	Qualitative		E		M		NI		NI		M		E
	Marginal Utility	Qualitative		M		M		M		M		M		M
	Overall Costs	**Qualitative**		**M**		**M**		**M**		**M**		**M**		**M**
	Overall	**Qualitative**		**M**		**M**		**M**		**M**		**M**		**F**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B
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0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
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4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming) PI's: 0003681, 0002862, 0003682			Alternatives 5. Alt 4 Plus Reroutings			
	Screen 2 Performance Criteria	Units	5A. Widen SR 20 and Reroute onto Widened SR 369*	5A. Qualitative	5B. Widen SR 20 and Reroute onto Bethelview Rd	5B. Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 40 minutes (majority of travel time savings come from widening of Buffington and Macedonia)	M	qualitative	M
	User Benefits	Hours of Delay (Total)	reduced by 2,700	M	qualitative	M
		Fuel Saved (per capita)	67.5	M	qualitative	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.98	F	qualitative	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	2.07	F	qualitative	F
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	324,600	F	qualitative	M
	Access management	Qualitative		M		F
	Safety	Qualitative		M		M
	Overall Performance	**Qualitative**		**F**		**F**
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	14,760.3 (607.92)	M	4,197.0 (252.07)	M
	Wetlands	Acres (Acres/mile)	1.0 (0.04)	M	0.0	E
	Lakes & Ponds	Acres (Acres/mile)	2.9 (0.1)	M	1.4 (0.1)	M
	Floodplains	Acres (Acres/mile)	43.5 (1.8)	M	11.8 (0.7)	M
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	15.9 (0.7)	NI	14.57 (0.88)	NI
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	4.3 (0.2)	NI	4.28 (0.3)	NI
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	14036 (578.1)	M	2,366 (142.1)	M
	Protected Species	#	6	NI	6	NI
	Noise Receptors	# (#/mile)	567 (23.4)	M	566 (34)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	23.5%	E	23.5%	E
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	23.5%	E	20.0%	E
	Farmland	Acres (Acres/mile)	390.9 (16.1)	M	168.4 (10.1)	E
	Number of Displacements	# of Structures (#/mile)	567 (23.4)	M	566 (34)	M
	Residential	# of Structures	375		327	
	Commercial	# of Structures	170		216	
	Industrial	# of Structures	3		5	
	Institutional	# of Structures	19		18	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	240 (449.4) / (9.88)	M	314 (531.5) / (18.86)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	8	NI	4	M
	Cemeteries	#	9	NI	6	NI
	Native American Interests	#	5	NI	1	NI
	Air Quality	Qualitative		M		M
	Indirect and Cumulative Effects	Qualitative		M		M
	Construction Impacts	Qualitative		M		M
	Mitigation / Avoidance Potential ($Million)*	Qualitative		NI (2.5)		M (0.6)
	Overall Impacts	**Qualitative**		**M**		**M**
Costs/ Other	Total Costs	$ (Million)	248.55	M	229.08	M
	Right of Way (250')	$ (Million)	102		133.6	
	Construction	$ (Million)	146		95.1	
	Operations & Maintenance	$ (Million) /year	0.55		0.38	
	Benefit/Cost Ratio	B/C	2.3	M	qualitative	NI
	Constructability	Qualitative		M		M
	Marginal Utility	Qualitative		NI		NI
	Overall Costs	**Qualitative**		**NI**		**NI**
	Overall	**Qualitative**		**F**		**F**

Legend:
E- Exceeds; M- Meets; NI- Needs Improvement
* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B

Distances of Alternatives:
0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
3A = 22.6 miles; 3B = 20.7 miles;
4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
4E-1= 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
4F-6 = 6.36 miles;
5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
**Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

*NOTE: SR 369 programmed for widening in Regional Transportation Plan and Bethelview Road to be widened under separate project

Attachment 11

VE Implementation Letter

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE: Cherokee & Forsyth Co. **OFFICE:** Engineering Services
P.I. No.: 0014131, 0014132, 0014133, 0002862, 0003682
SR 20 from CR281/Scott Road to SR 400

DATE: August 2, 2017

FROM: Lisa L. Myers, State Project Review Engineer

TO: Albert Shelby, Director of Program Delivery
Attn.: Cleopatra James

SUBJECT: IMPLEMENTATION OF VALUE ENGINEERING STUDY ALTERNATIVES

The VE Study for the above projects was held February 27 thru March 2, 2017. Revised responses were received on August 1, 2017. Recommendations for implementation of Value Engineering Study Alternatives are indicated in the table below. The Project Manager shall incorporate the VE alternatives recommended for implementation to the extent reasonable in the design of the project. Please note, if the implementation of any VE recommendation requires a Design Exception and/or Design Variance, those must be requested separately.

ALT #	Description	Potential Savings/ LCC	Implement	Comments
1.0	Reduce widening from 6 to 4 lanes at Union Hill Road to SR 371.	$23,515,000	No	The growth trends show that soon after the design year, volumes will be great enough to require 6-lanes. GDOT prefers to provide 6-lanes for consistency as well as to address the likely need so the design team will proceed with the original design.
2.0	Reduce Lane widths from 12' to 11' wide for all lanes.	$9,484,000	No	The design team has agreed to 2.1 instead.
2.1	Reduce inner lane widths in each direction from 12' to 11' wide (outside lanes remain 12' wide).	$6,335,000	Yes	This will be implemented.
3.0	Reduce median width from 20' to 16' wide.	$2,730,000	No	Please review the design team's entire explanation for rejecting this idea. The narrower median suggestion would make it more difficult for large vehicles to use the Restricted Crossing U-Turns (R-Cuts). The proposed 20 foot wide median allows for landscaping in a larger green space for the current context sensitive design.

4.0	Construct rural shoulder with 10' wide overall shoulder with 4' wide partial depth pavement.	$7,872,000	No	This corridor resides in a MS4 region and runs along a topographical ridge line. See the designer's response for more details, but a rural shoulder would not provide any containment or retention to help satisfy water quality goals of MS4.
4.1	Construct 12' wide urban shoulder in lieu of the 16' wide shoulder.	Proposed = $5,430,000 Actual = $1,097,730	Yes, with modifications	The designers will use this narrow shoulder option in areas to help minimize adverse impacts to adjacent resources.
7.0	Eliminate ponds at five property displacements for (PI# 0002862 & 0003682)	Proposed = $4,150,000 Actual = $1,245,000	Yes, with modifications	Designers will partially implement this suggestion and reduce the required ROW where feasible for the modified savings amount.
10.0	Perform detailed MS4 calculations to allow for elimination of ponds; acquire non-pond parcels first.	Proposed = $21,755,000 Actual = $14,503,300	Yes, with modifications	Please see the designers attached full responses for 4.0, 7.0 and 10.0 but after further analysis it is assumed that the ponds can be reduced in size which will reduce the required ROW for the modified savings amount.
12.0	Use a consistent required Right of Way width; and use permanent easement beyond.	Proposed = $16,950,000 Actual = $8,430,000	Yes, with modifications	This will be partially implemented for the modified savings amount.
17.0	Use Design/Build Delivery method to meet expedited schedule.	$8,831,000	No	Time savings could be realized through this delivery method, but with the current accelerated schedule set by the GDOT Commissioner the time has already been condensed.

The Office of Engineering Services concurs with the Project Manager's responses.

Approved: Margaret B. Pirkle **Date:** 8.16.17
Margaret Pirkle, PE, Chief Engineer

LLM/EAR/MJS
Attachments
Cc: Hiral Patel
Albert Shelby/Kimberly Nesbitt/Cleopatra James
John Hancock
Aaron Burgess
Lisa Wesley
Andrew Pearson
Chuck Hasty/Matt Sanders